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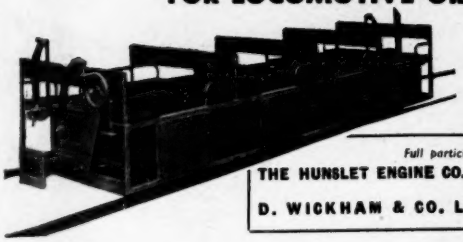

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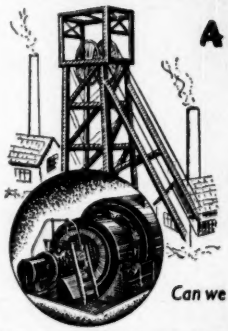

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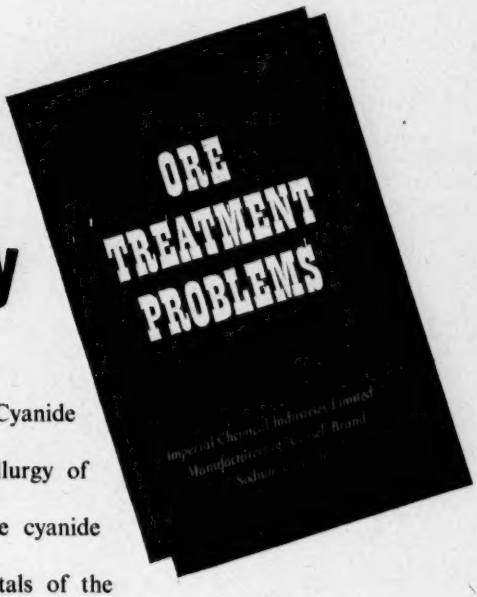

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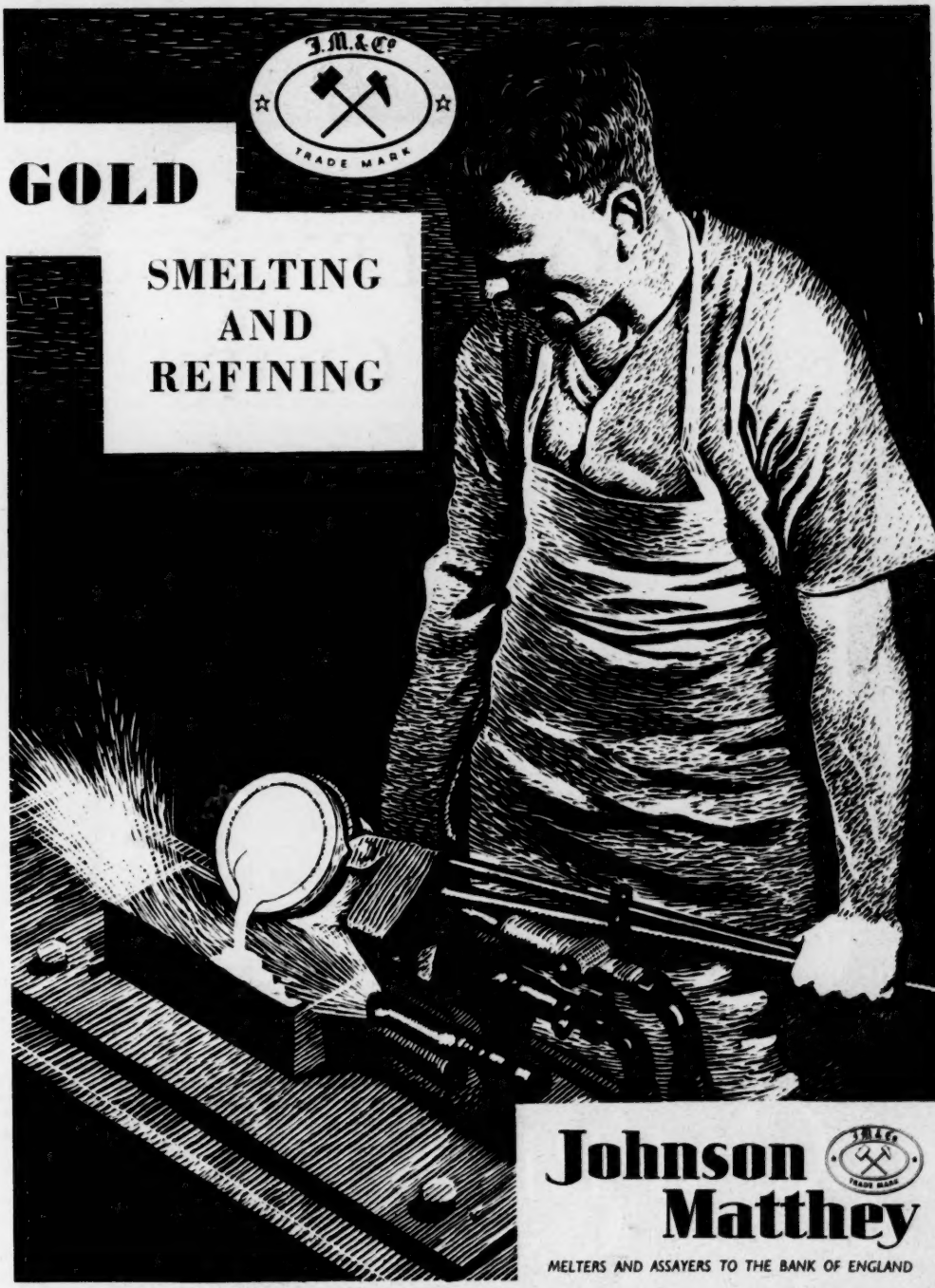

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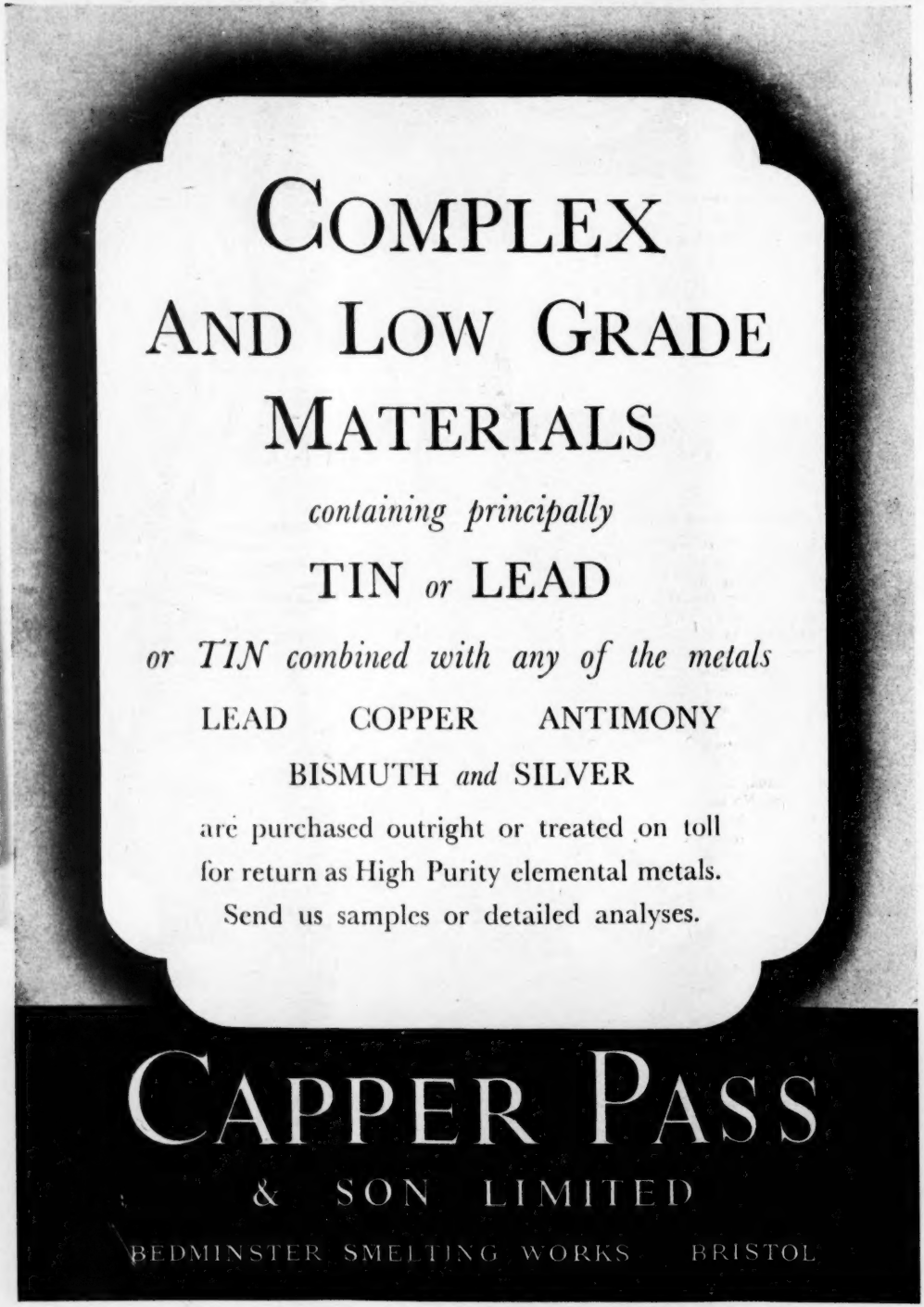
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NOTES AND COMMENTS

Geology of the British Guiana Hinterland

We have recently received *Bulletin* 22 *of the Geological Survey of British Guiana* by Mr. P. H. A. Martin-Kaye, A.R.C.S., F.G.S., discussing the Roraima formation of British Guiana and tracing the exploratory work which has been done from the time of Sir Robert Schomberg in the thirties of last century to the present day. The Roraima formation occupies remote and often practically inaccessible regions on the confines of British Guiana, Venezuela and Brazil, with small outliers in Surinam, and possibly extending as far as Central Columbia. Its area is estimated at over 500,000 sq. miles and it is situated in the watershed region between the Orinoco and the Amazon. The formation extends over about 15,000 sq. miles of British Guiana, or approximately one-sixth of the Colony's total area. No mineral deposits of immediate economic importance in the Formation are as yet known. It has long been recognized that the distribution of the diamond fields is closely related to the Formation as they are situated generally in the neighbourhood of escarpments, and some are actually located in the sandstones themselves. The diamonds are believed to be re-concentrated from the alluvial conglomerates of the plateau originally accumulated from older rocks. Crushing and panning of the conglomerates have occasionally given one or two "eyes" of gold in the battel, and traces have been found in the gravels of many streams on the Pakaraima mountains. But in the geologist's opinion there is little prospect of it ever being profitably worked in the mountains themselves. The occurrence of quartz crystals in the Pakaraimas has been known for over a century, and some prospecting was undertaken at the time of the second world war. However, the samples selected for physical tests were generally unsatisfactory, but further search might yield suitable material.

The possibility exists that a lateral extension of the Roraima formation existing in the accumulated pile of sediments forming the Continental Shelf might provide a potential rack reservoir for petroleum, and in 1941 Trinidad Leaseholds sank an exploratory borehole in Berbice to a depth of 6,456 ft., being then in a quartz-felspar porphyry. But the question whether potential source rocks are present in the sediments of the Shelf is quite undetermined.

More economic importance may attach to the possibilities of harnessing various waterfalls for the generation of hydro-electric power. The Kaieteur Falls of the Potaro River with a vertical drop of 741 ft. are well-known, but all rivers rising in the Pakaraima mountains exhibit somewhat spectacular falls, usually of hundreds of feet. The Utschi Falls has a main vertical descent of 714 ft., the Kamarang Great Falls probably exceed 600 ft. and the King Edward VII Falls in the Semang drop 721 ft. and the Great Falls of the same name total over 600 ft. But for the time being the Pakaraimas are inaccessible to any volume of heavy equipment.

Goa to Double Iron Ore Output

Commander Sarmento Rodrigues, Portuguese Overseas Minister in Goa, laid the foundation of an iron ore bin at Sirigao, 17 miles from Goa, writes our Indian correspondent in a recent despatch. By the end of this year, the bin will step up iron ore exports from Goa by 300,000 tons to 750,000 tons. Mr. V. D. Chowgule, managing director of the Indian company to whom the bin belongs, said that the scheme to work the bin had been approved and considered the first project under the United States master plan for the development of South East Asian resources.

The mechanization of the bin, which can turn out 2,000 tons a day, has been undertaken by the Indian company under the terms of a three-year contract with a Japanese mining firm. The replacement of the cost of machinery amounting to Rs. 8,000,000, is associated with the sale of 1,500,000 tons of iron ore to be shipped to Japan during the three years on a *pro rata* basis.

"I can safely declare," said Mr. Chowgule, "that after the expiry of these three years, we shall be in a position, if necessity arises, to mine and export iron ore of good quality from these and other mines in Costi, near here, at prices prevailing before World War II." Forty-seven Japanese technicians from the Japanese company, which has supplied the equipment of the mine, are working on the site of the bin.

Mining Activities in Fiji During 1951

The history and current prospecting activities of the gold mining industry in Fiji were outlined by Mr. A. G. Thomson in *The Mining Journal* of July 18. Fiji is by no means the least interesting among the younger mining fields of the British Empire, and additional information to that contained in Mr. Thomson's article has since been made available in the official report of the Inspector of Mines, Mr. James Taylor. The report covers last year's mining activities over a wide field.

The Colony was fortunate in the early discovery of high-grade gold deposits in the Tavua field in the north of Viti Levu where an annual production slightly exceeding 100,000 f.oz. was gradually developed. However, like Cyprus, the Fiji Islands suffer from their comparatively small land areas, and with the three important gold mines the Emperor, Loloma and Dolphin, comprising the Associated Mining Companies, showing signs of depletion, the future is becoming somewhat restricted. Vigorous prospecting, more particularly for manganese by Indian immigrants, has been active; so far with nothing of extensive promise in sight; and to a much smaller extent to base metal possibilities, lead-zinc and copper. The islands are remote and the local capital available very small and quite insufficient to attack base metal propositions on a substantial scale.

The three gold-mining companies already mentioned are contiguous and an extension of their operations underground has permitted of an integration of drainage of the field as a whole, but the ore deposits are irregular, entailing the use of several mining methods to cope with variations in dip from the almost flat to the vertical, entailing various methods of underground operations, while there are several opencuts which are gradually being exhausted.

From the Emperor mine last year 155,473 tons of ore were treated, an increase of 17,000 over 1950, but the production at 56,191 f.oz. of gold and 14,257 oz. of silver, was practically the same owing to the fall in grade. Reserves continue to show a decline, and were 55,000 tons less than in the previous year with a total of 930,000 tons averaging 7.9 dwt. The Loloma mine treated 18,517 tons of ore averaging about 31 dwt. to the ton with a recovery of 28,981 f.oz. of gold and 7,754 oz. of silver. This was a considerable advance on the 22,982 oz. recovered in 1950 despite the reduced tonnage treated, and was due to the milling of very high-grade material from the opencut. Reserves, however, were 6,000 tons less at 42,000 tons averaging 1 oz. to the ton.

The Dolphin mine is already approaching exhaustion and the tonnage milled last year was only 10,257 tons of ore for a yield of 10,423 f.oz. of gold and 2,839 oz. silver, against 23,843 f.oz. gold in the previous year. The ore reserves a year ago had been reduced to 20,000 tons with an average grade of 25 dwt. The total gold production of the colony was 95,635 f.oz. gold compared with 103,423 oz. in 1950 and 24,869 f.oz. silver against 37,740 oz. in 1950.

Some benefit was experienced towards the end of the year by the selling of gold on the free market at a premium of some 23s. (Fijian currency) per f.oz. The earlier benefit of British currency devaluation is gradually losing its effect with rising costs. Mining costs at the Emperor a year ago are given as 21s. 4d. per ton milled and at Loloma at 61s. per ton milled while the Dolphin costs in the same period rose by 10s. 6d. per ton.

Ore treatment at the central mill of these three Associated Mining Companies handling 180,852 tons of ore, with recoveries of 90.2 per cent, 93.1 per cent and 92.9 per cent respectively, is briefly described as follows: "Two-stage coarse crushing followed by two-stage fine grinding and classification to approximately 72 per cent —200, in lime and cyanide solution, followed by thickening to 32 per cent solids and 34 hours agitation to dissolve the cyanidable gold values. After filtration, washing and repulping with fresh water, the pulp is acidified with sulphur dioxide gases from the Edwards roaster. It is then aerated and the remaining gold-bearing sulphides recovered as a flotation concentrate. This concentrate is then thickened and dewatered and roasted. It is then agitated for seven days in a strong cyanide and lime solution, decanted, passed to the main ore filtration circuit, and the gold precipitated by zinc dust."

A good many prospecting licences were in existence during the year, but many of them, including one on which 10,000 tons of 8 dwt. gold ore had been proved, were allowed to lapse, largely through inability to secure outside capital. One of the most interesting of these areas held under prospecting licence was in the Wainivesi valley in the Sawakasa district held by Base Metals (Fiji) Syndicate. The property was examined by a New Zealand consultant who confirmed the presence of high values in zinc (20 per cent in limited exposures of primary ore) with lesser copper, lead, gold and silver contents, but attempts to interest Australian or Canadian companies have so far been unsuccessful. Elsewhere in the Vuda mining area, a mining lease held by the Natalu Gold Mining Syndicate was examined on behalf of the Pacific Mining Corporation of New Zealand and a small milling plant was erected which recovered a few ounces of gold during the year. An area in the Wiadina valley, believed at one time to be a potential gold bearing site, failed on examination by the Mining Department's officers to show more than traces of gold.

Most prospecting activity during the year was directed to manganese, and the existence of exportable deposits has, as a result of the past three years' prospecting, been established in the western district of the Viti Levu. So far, however, prospects seem confined to the high-grade chemical section of the manganese dioxide market; 631 tons were exported, chiefly to the United Kingdom. The Inspector of Mines doubts if sufficient tonnages of low-grade material will be found to interest the metallurgical grade market, which requires large tonnages and regularity of supply. Attempts are being made to beneficiate the ore by screening and gravity concentration, but as no mining has been done to a greater depth than ten ft., and as the deposits are believed to be of secondary origin, making estimates of ore reserves are very difficult.

Further examination was made of a copper discovery at the head of the Sabeto valley in the Nadi district, but only one small outcrop promised to yield payable values. An occurrence of phosphate on Ogea Driki was briefly examined but did not appear to be particularly attractive. During the year the Colonial Development Corporation abandoned its Navua Hydro Electric Scheme as too expensive, which was a considerable disappointment to the Fijians.

In all, 1,460 persons were engaged in mining during the year, of whom 1,021 were Fijians, 229 part-Europeans, 135 Indians and 75 Europeans.

Asbestos Treatment in Western Australia

An article in *The Mining Journal* of June 13 described the asbestos deposits of Western Australia. Further information received from Australia House, London, states that the reserves in the Wittenoom area are estimated to contain 344,000 tons to the sq. mile. As pointed out in our previous article, the Wittenoom area comprises the known deposits of Wittenoom's Gorge, Marramamba, Yampire Gorge, and Dale's Gorge. The reserves occupy a strip of country between 70 and 80 miles in length and a mile in width, set on the northern side of the Hammersley Range. Wittenoom's Gorge is the sole lease being

currently worked, with the others regarded as reserves for asbestos of different quality and length of fibre.

The deposits lie in horizontal seams in a similar manner to coal seams. The Wittenoom field comprises two seams, the upper averaging 2¼ in. in thickness, the lower 2 in. The seams are 24 ft. apart, a circumstance which facilitates the recovery of the asbestos. Previously they were mined as separate drives, but in more recent developments they are mined simultaneously, the asbestos from the top seam being scraped via winzes to the edge of the cut and dropped into trucks working on the level of the lower seam.

At the treatment plant, the asbestos is stored in bins from which it is issued on picking belts; impurities are picked out, discarded, and the asbestos dropped through a chute to a series of cracking plants. In the first of these operations it is reduced in size to 4 in. x 2 in., in second to 2 in. square, and the last reduces it to 1 in. square and fluffs up the fibre.

After the final reduction, the asbestos is put over vibrating screens for a preliminary grading. First grade material, that is those fibres which measure 1¼ in. and longer, and second grade materials, those which measure from ¼ in. to 1¼ in. are passed through a hammer mill and rolls. The fibre is then removed by suction and is bagged. The third grade material drops through the vibrating screen, passes through the hammer mill, and across the screens again and again for the maximum recovery of fibre.

Australia

(From Our Own Correspondent)

Melbourne, August 1.

Much Press publicity, which discloses nothing of importance, is being given to the Rum Jungle uranium deposits. There seems good reason to believe that further development may open up a substantial quantity of mineral of economic grade, and there are reports of a large copper deposit in the vicinity. There is a statement that a large Australian company will take over the working of the uranium deposits on behalf of the Commonwealth Government, a very desirable circumstance if operations are to be economically and satisfactorily carried on. There is no reason to suppose that the Rum Jungle uranium deposits are of abnormal richness, but it is reasonable to expect a grade of ore rather above the payable base.

Copper mining has received some impetus from the discovery of high grade ore in the Peko mine ,at Tennant Creek. While the grade is high, the likely tonnage of ore to be available has yet to be proved. For some time, high grade oxidized and semi-sulphide ore was produced at the Home of Bullion mine, Barrow Creek, and a lesser producer is Jervois Range, where shoots are small and irregular. Evidence points to the high grade shallow ores in the Territory passing into much lower grade sulphide in the primary zone, which will be the controlling factor in the future of copper mining. There has been talk of a smelter, but present and prospective supplies of ore are inadequate to justify this venture.

FUTURE FOR AUSTRALIAN METALS

The Bureau of Mineral Resources foresees substantial expansion in the next few years. When the copper section at Mount Isa Mines is brought into production towards the end of this year, Australian copper production is expected to reach 35,000 tons per year. As development proceeds, it may be found that the Mount Isa copper lode is capable of greater output than is at present contemplated. Other copper-producing areas that may receive further attention are the Cloncurry field, near Mount Isa, in Queensland, and the Jukes-Darwin area, near Mount Lyell, in Tasmania.

There is great need for an increase in copper production, for domestic consumption now exceeds 50,000 tons per year, and it is expected that for the next decade the country must import from 15,000 to 30,000 tons per year. Production of lead in concentrates is expected to rise from the 1951 figure of 203,000 tons to 250,000 tons by 1955, due to increases in output by the Broken Hill, New South Wales, mines and lead mines in Tasmania and Western Australia, while it is probable that Mount Isa will add substantially to the figure. It is forecasted that recoverable zinc in concentrates will increase from the 1951 figure of 156,000 tons to about 200,000 tons.

The outlook for tin production is less happy than that for copper, lead and zinc. Normal domestic requirements are between 2,400 and 2,800 tons per year, but output has steadily fallen over recent years. In 1951, only 1,438 tons of tin were won, as against an average over the previous three years of 1,950 tons. In about three years' time the tin plate plant at Port Kembla, New South Wales, will be in operation, and this enterprise will increase consumption of tin to over 5,000 tons per year. The present position of the industry is due largely to the exhaustion of the property of Tableland Tin N.L., in North Queensland, a position that will take about two years to rectify with the removal of the dredge to the new leases on Smith's Creek, nine miles from the present property.

General apathy on the part of investors is responsible for the neglect of prospecting for tin, or the re-opening of small properties of some promise. The Broken Hill Proprietary Co. is reported to be taking an active interest in tin occurrences in the Northern Territory, and the Marranboy district has been selected for detailed examination.

OPPOSITION TO MECHANICAL EXTRACTION

Over recent months a number of conferences between the Joint Coal Board and the Miners' Federation were held with the object of finding a solution to the obstinate opposition of the miners to the mechanical extraction of pillars. It seemed likely that the offer to introduce stowage might be a means to the withdrawal of opposition, the main contention of the miners being that mechanical working is unsafe, despite overwhelming competent opinion to the contrary. While there are parts of mines under relatively shallow cover where subsidence might effect buildings or land surface, a very large tonnage of pillar coal could be extracted without disturbance of the surface.

Proposals for mechanical extraction have been definitely rejected, together with the offer, or guarantee, of both Federal and New South Wales State Governments that mine stowage would be introduced if the miners agreed to mechanical extraction of pillars. The union, however, promised to confer further with the Joint Coal Board on matters in dispute connected with this subject. The union is fully aware of the serious effect on the country's economy which results from the locking up of great tonnages of coal in pillars, and of the loss of valuable power reserves through crushing and spontaneous combustion. It is considered that the reasons for the strenuous opposition are first financial, for miners get high rates of pay in those mines in which pillars can be extracted with some profit by hand work; second that the unions have steadily lost the long fight against mechanization of which pillar working is the last ditch, despite the greater safety of mechanical work.

Under the mining regulations, as much as 70 per cent of coal must be left as pillars in first working, according to the depth of cover. On the northern N.S.W. fields alone, the estimated quantity of high grade gas coal in pillars is 270,000,000 tons, and on other fields in the State a large tonnage of lower grade coal is similarly locked up

Compressed Air in Metal Mining—Part 1

By J. B. RICHARDSON, A.R.S.M., M.I.M.M., M.A.I.M.E. (Royal School of Mines).

Whilst admitting that compressed air is not an efficient means of power transmission, the author of the following article points out that in metal mining it can be rendered far less costly by remedying poor layout and leakage losses. These two detrimental factors were elaborated upon in a paper presented at a Technical Reunion of the British Compressed Air Society on March 21, 1952. Extracts from the first part of this paper are reproduced here by courtesy of *Compressed Air Engineering*.

Metal mines are probably the world's greatest consumers of compressed air: for every five tons of mineral raised approximately one ton of compressed air is sent underground. In this form it costs, per horse-power, roughly four times as much as electricity. But it is a form of motive power with comparatively low initial cost for equipment, simple installation, and variable speed control, and it is reliable and, above all, relatively safe even in the hands of fools.

EFFICIENCY OF COMPRESSED AIR

Oliver Lyle, whilst chairman of the war-time London branch of the Fuel Efficiency Committee, stated in a paper before the Institute of Fuel that "compressed air is probably the most inefficient way of transmitting power; under fairly good conditions the efficiency is sometimes as low as five per cent." Another authority points out that compressed air is bound to be uneconomical in use in underground conditions, and gives the following example. Starting with 2,000 cu. ft. of air at atmospheric pressure and 60°F., on compressing to 80 lb. per sq. in. the temperature rose to 429° F. and the volume was reduced to 540 cu. ft. On entering the mine it cooled to the temperature of the workings (say, 60° F.) and the pressure dropped to 40.6 lb. per sq. in gauge. The energy required in compression was 7,554,670 ft.-lb., while the energy remaining in the air after cooling was only 3,365,550 ft.-lb. or 44.8 per cent. More than half the energy was thus expended in the inevitable cooling. Taking transmission losses into account it was fortunate if an overall efficiency of 18 per cent could be obtained between input to compressor and output of engine. Tests made on rock drill plant gave an overall efficiency of six per cent between input to compressor and output of drill. These two authorities are therefore in close agreement.

Due to its harmless nature and invisibility, compressed air is more likely to be wasted than steam, gas or electricity. This wastage results in a still higher cost for what is already a fairly expensive service. Anyone who is accustomed to visiting metal mines will agree that much money is lost in the majority of underground workings by not observing basic principles. The two main causes of loss are: (*a*) poor layout; (*b*) leakages.

LAYOUT OF COMPRESSED AIR SYSTEM

Let us deal first with layout. The compressor plant is usually on the surface and under the direct supervision of a qualified mechanical engineer who, if he sees that the plant is correctly lubricated and subjected to periodic systematic overhaul, will probably get as good a service from it as the manufacturers expect. Nevertheless, miners working at the face underground frequently complain of low pressure even though optimum pressure is maintained at the surface; and, once the compressed air has entered the air mains on its way underground it passes into the domain of the mining engineer.

Mining is progressive from definite starting points and air mains frequently follow the development blindly on no predetermined plan; often a main artery will be built up of pipes of various diameters as it runs up rises, along sub-levels, and through stopes to the final working point by a route several times longer than necessary.

The pipefitter commonly uses square tees, elbows, reducers and valves of many different types: all of which cause turbulence and reduce pressure. A globe valve in a 3-in. main is equal to an additional 13 ft. of piping. Elbows and tees are equal to about two-thirds of that figure, so that a length of 200 ft. of 3-in. main with one valve, two elbows and three tees is equivalent to 258 ft. of piping, or nearly 30 per cent more.

The layout starts, of course, at the several compressors, A mine with two shafts and a compressor at each one can steady the pressure by balance pipes either on the surface or underground.

If there are several compressors installed in clean rock chambers underground, where they will run always at a uniform temperature, the use of balance piping to form local ring mains underground prevents a large drop in pressure locally when there is a sudden call for air for any special reason.

Air mains may be divided into three sections: (*a*) hot section; (*b*) condensation section; (*c*) cool section.

It is in the second that trouble is likely to occur and a sound measure against the effects of condensation is to coat the inside with aluminium paint. It is safe to say that the larger the pipe the better, since for a given diameter the friction loss is approximately proportional to the square of the velocity, while the force necessary to increase the velocity is directly proportional to the acceleration, *i.e.*, to some function of the first power of the velocity. It follows, therefore, that if the pipe is of the correct diameter the frictional loss is small, remembering always that existing pipelines are extended to supply air to new workings with little regard to the distance and to the number of fresh users.

To return to fittings, valves of good type, preferably full-way valves, colateral or lateral Y's and easy bends should be used instead of the common types of screw-down valves, square tees and elbows. Better fittings are a good investment: pitcher tees are expensive—double the price of square tees—but Y's cost only 30 per cent more than square tees and, with the branches in the the direction of flow, they cause much less reduction in pressure.

Badly shaped jointing material of all kinds causes turbulence when it protrudes into the piping and the same effect is produced when good gaskets are badly fitted.

Another feature of layout is the position of the air pipes in the galleries of the mine. There is no doubt that the right location is shoulder-high or a little higher in the larger openings. It must be well supported on or from well aligned dowels on the side of the drift or crosscut. In rises and winzes it must be placed well out of the way of falling rock.

LEAKAGE OF COMPRESSED AIR

This grievous loss, which different writers give as varying between 15 and 30 per cent of the total supply, arises from many causes:

(1) There may be misuse or intentional leakage: in a hot mine or in a stuffy end of a fairly cool mine there is a great temptation for workers to take advantage of the cooling effect of compressed air on expansion. Even ¼-in. air jets should not be allowed.

(2) Another cause is the installation and maintenance of at least all subsidiary lines, *i.e.*, 3-in. and under, by unskilled or semi-skilled labour.

(3) A third is damage, breakage or strain by concussion

from explosion or even direct blows from fly-rock.

(4) Yet another cause is the corrosion and pitting of pipes by acid water dropping on them, especially in pyritic mines.

(5) Valves with bent or otherwise damaged spindles.

(6) Leakages caused through the re-use of bad, old or faulty material.

(7) Couplings or flanges not properly screwed up.

(8) Straining of joints during installation or due to pressure of material placed upon them.

A 1/16 in. hole will cause a loss of about 6 cu. ft. per minute at 100 lb. per sq. in. and a ¼ in. hole will give a loss of over 25 cu. ft. per minute, enough to run a small tool. A ¼ in. hole leads to a loss of over 100 cu. ft. per minute, or enough to run a modern drifter.

One way of combating the leakage demon is to pay an efficiency bonus to pipefitters, deducting from it for every leak found in his section that can be proved to be his responsibility, but in a rapidly extending mine where it is necessary to have pipefitters on all three shifts it just does not work.

Another way is to appoint a perambulating "policeman," who goes through the mine once every 24 hours, has fairly light duties and whose task is to detect and report all leaks and sometimes to carry round a suitable kit of tools to deal summarily with as many of the troubles as possible.

If practicable—that is, when not more than one or two pipefitter shifts are worked—the former measure is preferable, because it gives the pipefitters an incentive to do good work in the first instance and to demand new pipes and fittings when necessary.

Reverting to the prevention of pressure losses, particular attention should be paid to the internal diameter of air cocks and hose connections and, as regards hoses, they should be limited in length—a maximum of 40 ft. in development ends and 60-70 ft. in stopes.

Where literate white miners are employed a useful table can be displayed which converts the size of hole to cu. ft. per minute of free air, to horse-power needed to compress that amount and to the cost per month with the equivalent in rock drills driven. For instance, a 1/64 in. hole is equal to 0.33 cu. ft. per minute at 80 lb. per sq. in. which takes 0.04 h.p. to compress and costs 5s. a month, whereas a 1 in. hole loses, 1,310 cu. ft. per minute, needs 187 h.p., is equivalent to 13 rock drills, and costs £250 a month. The aim of this measure is to make operators and supervisors cost-conscious.

SUPERVISION OF AIR SUPPLY

In very large mines it is wise to employ an engineer full-time on studying the problems of compressed air and controlling its supply.

To effect real economy on a mine there should be:

(1) A responsible official, as above, appointed to control the use and application of compressed air.

(2) A proper piping plan of all working so that by inspection or by calculation the responsible person can see what pressure to expect and, by comparison with daily recording pressure charts for main lines, detect leakages or obstructions.

(3) A planned layout for all future piping.

(4) Pressure regulation by running compressors to suit the mine load factor.

(5) Physical monthly checks on all working.

Water is perhaps the greatest bugbear in air mains. It washes away lubricants from the machines, causing excessive wear and high maintenance; at low points it forms restrictions to reduce the carrying capacity of pipes. The expansion on exhausting to atmosphere causes rapid cooling: starting at 70° F., freezing point is reached in expanding less than twice and the water then freezes, blocking the passages in drills or pumps and stopping them from working.

In all main development headings a proper system of rigid ducts of suitable dimensions should be installed with a reversible electric fan to blow air on to the face while the drillers are drilling and exhaust the dust and fume-laden air after blasting. In working places where this is impracticable and compressed air must be used, properly designed venturi tubes should be installed; these may consume only 40 cu. ft. of air to blow 1,000 cu. ft. into the face.

Lubrication is another subject that has been much discussed in the past but, with the provision of efficient air-line oilers, it now need not be a serious problem. The right grade of lubricant is essential and a certain degree of embarrassment is caused at mine stores abroad by the fact that each manufacturer seems to insist on a different lubricant for each type of machine.

OPTIMUM AIR PRESSURE

It is essential in modern mining practice to have a consistent and sufficient pressure at the rock drill, combined with good equipment and first-class maintenance.

High air pressures have the following advantages:

(*a*) Greater speed of penetration; an increase of about 1.8 per cent per lb. increase in air pressure is obtained.

(*b*) Transmission losses are less. The quantity for a given pressure is proportional to the absolute pressure.

(*c*) Air motors operate more efficiently at 85 lb. per sq. in. or over and American equipment is designed to run at such or higher pressures.

Low pressures also have advantages:

(*a*) Reduced wastage, which, as seen above, is high. Leakage is directly proportional to absolute pressure, so lower pressure means a decreased demand.

(*b*) Hand-held tools of all kinds are easier to manipulate.

(*c*) Drill steel breakages and rock drill maintenance are lessened.

(*d*) Generating costs are lower.

It is usual to compromise at about 80 lb. per sq. in. between mechanical efficiency, drilling cost and air leakage.

The air column should be sufficiently large to limit the pressure drop from the compressors to the working point to a maximum of 10 lb. per sq. in.

Most air-flow measuring devices depend for accuracy on perfectly streamlined airflow; pulsations and turbulence must therefore be avoided.

There are three types of pulsating flow:

(1) Pulsations caused by a reciprocating compressor or other machine near the measuring device.

(2) Pulsations due to pressure fluctuations.

(3) Turbulence caused by elbows, bends, tees, valves or bad joints.

When it is necessary to discover the optimum size of a new main a useful formula is

$$\Delta p = K \frac{W^2 L}{d^5}$$

where p = pressure drop in lb. per sq. in.;
K = condition factor;
W = weight of air flowing in lb. per second;
L = length of pipeline (ft.) plus extra footage for valves, bends, tees, etc.
d = the diameter of the pipe (in.)

K varies from 1.85 for a 1 in. pipe with a roughened interior to 0.90 for a new smooth-bored 30 in. pipe.

In any doubtful case this can be checked by Kelvin's formula, where interest on capital expended on the pipeline plus depreciation equals cost of transmission losses.

Liberia Seeks Amended Iron-Ore Contract

Although the iron ore deposits of the Bomi Hills region in Liberia are not extensive when judged by world standards, they are of high quality and exist in sufficient quantity to satisfy one per cent of America's requirements. In the following article, American reports of the development already accomplished in the area are given in condensed form. In addition, from notes supplied by Mr. Arthur H. Thrower, the Liberian Government's case is presented for an amendment of the existing contract between that country and The Liberian Mining Co. which is working the deposits, and the clauses of a suggested new agreement which would prove more beneficial to Liberia are outlined.

The discovery of iron ore deposits in the Bomi Hills area of Liberia prior to the cessation of hostilities after the Second World War, led to the signing of an agreement on August 27, 1945, between the Government of Liberia on the one hand and the Liberian Mining Co. on the other, which was followed on June 1, 1949, by a sub-agreement concluded between the Liberian Mining Co. and Republic Steel. Both companies are owned and controlled in the United States.

Liberian ore has been called the richest iron ore in the world, and that so far extracted from Bomi Hills has yielded an iron content variously given as from 68.47 per cent to 68.825 per cent. These figures supplant the Swedish product, according to a recent survey, and excellent results are reported from a shipment to the United States which reached that country in June of this year. The Liberian Mining Co. states that production at present totals approximately 90,000 tons of ore per month, and the physical make up of the product is quoted as being of hard dense lumps, free of fines and with ideal size distribution.

THE AGREEMENT AND THE CASE FOR ITS AMENDMENT

At the time of the 1945 contract, the Liberian Government agreed to a premium based on the New York market price for Bessemer-grade pig iron and a fixed royalty of 5c. per ton in return for which the Liberian Mining Co. obtained an 80 year lease giving it the exclusive right to mine all minerals except gold, platinum and diamonds within a 40 mile radius of the Bomi Hills.

In making this decision, the Liberian Government was guided by the belief that, in order to exploit successfully the Bomi Hills deposits, the Liberian Mining Co. ought to assume a position which would allow its product to compete with low grade American ores. The decision was further prompted by the additional consideration of the indirect benefits which were expected to accrue from the company's establishment in Liberia.

These anticipated benefits, however, have largely proved to be illusory as owing to the highly mechanized operations, the employment of Liberian labour remains at a low quota. At the present moment between 1,200 and 1,500 men are employed on the mine site, about 25 per cent of them being Americans. A low wage scale of less than 50c. per day emphasizes a situation which does little to further the welfare of the country and its population.

Although the royalty of 5c. per ton originally agreed upon may appear to be on the low side it was, presumably, considered adequate in view of the expectation that the Liberian Mining Co. would have to finance the construction of access roads and a bridge across the St. Paul River. In the event, however, this course of action was not followed.

The Government of Liberia negotiated with the Government of the United States for the construction of the access roads and the 980 ft. reinforced concrete bridge across the river, which was opened in 1949. The building costs were estimated at approximately $3,000,000 but were chargeable against the Port Construction, and were to be met by the Liberian Government with revenues accruing from the port. The Liberian Mining Co. was thus relieved of this capital expenditure and the matter became a charge on the Liberian Government. This expenditure would not have been a charge on the Liberian Government had the Holland Syndicate been granted the right to work these deposits when it originally made application to do so.

LIBERIAN GOVERNMENT SEEKS DIRECT REPRESENTATION

For these and lesser reasons, Liberia now seeks to amend the contract on the grounds that the iron ore, which is now recognized to be of good quality and present in sufficient quantity to supply one per cent of America's needs, is being mined by the Liberian Mining Co. for the existing royalty of 5c. per ton and the premium based on the New York market price for Bessemer-grade pig iron, and that the company neither pays for the ore nor pays taxes on any income derived from its operations. Aware of the substantial profits to be earned from the Bomi Hills deposits, the Government is seeking an amendment which will give it 50 per cent of the net profits and representation on the Board of Directors of the Liberian Mining Co.

These are a few of the salient points which prompted a memorandum to the company from the President of Liberia, in which he said that the nation's economy had previously been based on rubber, which had fallen in price from 70c. to 25c. per lb., and had been adversely affected by the introduction of the synthetic product. There was not, he added, a synthetic form of iron, and since mining was an extractive industry it was essential that Liberia now receive a fair share of the benefit accruing from the exploitation of the Bomi Hills deposits. The ore removed was irreplaceable, and as other interested mining companies would expect similar terms to those given the Liberian Mining Co., the Government was anxious to establish conditions which could generally apply. He declared that the Government felt that it ought not to continue to allow extraction of such high grade ore without obtaining an equitable return, and that the nation's current share of only $2,000,000 out of a potential profit of $480,000,000 was inadequate.

POTENTIAL FINANCIAL ASPECTS

As the agreement exists, the Liberian Mining Co. can extract high grade ores at a cost of $3 per ton for sale to its subsidiary in America for processing at $7 per ton. This is the minimum assessment of the value, but it is thought that the product will probably command a price nearer $15 per ton. At this latter figure, an annual production of 1,500,000 tons would yield a yearly profit of $18,000,000.

Although the Liberian Government realizes that The Liberian Mining Co. has invested in the development of the Bomi Hills project, and that the company naturally anticipates the investment to be a profitable one, the fact nevertheless remains that when the contract of 1945 was concluded the company was only expecting a modest profit. The extreme richness of the ore itself, a fact not originally known, has brought about a change in the situation, and there is every indication that this revision will be a permanent one.

The following table, based on a production cost of $3 per ton, shows the potential profits of the enterprise:

Annual output: 1,000,000 tons			Annual output: 1,500,000 tons		
Sale Price	Profit per ton	Total profit	Sale Price	Profit per ton	Total profit
$	$	$	$	$	$
10	7	7,000,000	10	7	10,500,000
11	8	8,000,000	11	8	12,000,000
12	9	9,000,000	12	9	13,500,000
13	10	10,000,000	13	10	15,000,000
14	11	11,000,000	14	11	16,500,000
15	12	12,000,000	15	12	18,000,000

In an effort to effect a change, the Liberian Government has submitted a new contract in the following suggested terms:

That a 50 per cent share of the net profits should be given the Government, that all indebtedness of the company should receive priority consideration before the determination of profit, and that all sales of ore should be made at prevailing world prices. No price preferential should be allowed to any company participating as stockholder in The Liberian Mining Co. The Liberian Government further recommends that it be granted representation on the Board of Directors and that it be allowed to vote as a stockholder.

Current reports of the Bomi Hills development tell that the mine project which has been estimated to cost approximately $U.S.4,000,000 was financed with the aid of the Export Import Bank, which loaned The Liberian Mining Co. part of the necessary initial capital. Extensive diamond drilling is being pursued, but no definite expansion plans are in the making, and original estimates of, an annual production of 1,500,000 tons are no longer applicable. At the present time, the Bomi Hills operation is open-pit, with underground mining contemplated sometime in the future. Although iron ore deposits have been discovered in other parts of Liberia, exploration activities to date indicate that other deposits do not contain as high a grade of ore as that of the Bomi Hills region. Republic Steel is taking the majority of the mine's production quota, with any excess above the contracted amount available to the open market.

American reports state that the artificial harbour at Monrovia was already under way when the mining project began in 1948. Approximately half the cost of the overall project was expended on railway construction, and more than 2,200 men were employed in clearing a path through heavy forest land between the mine and the port. Bridges were built, and in April 1951, the first train travelled from Monrovia to the Bomi Hills. At the port, ore handling plant was installed, with the result that ships can be loaded from the stockpile at a loading rate of 3,000 tons per hour.

Production of Strategic Minerals in Greece

The production in Greece of fourteen basic minerals, most of which are of strategic importance to Western defence, is being developed by means of American aid. The following article describes the general deposits of the country and emphasizes the increased mineral output of the post-war years.

In *The Mining Journal* of February 9, 1951, an article on the mines of classical Greece stated that the ancient silver, lead and zinc mines which in olden times gave supremacy to Athens, might once more play a large part in the economy of modern Greece. The article dealt in the main with the historic Laurium mines, approximately 25 miles south-east of Athens, and pointed out that these were to be expanded and re-worked by modern techniques. A Marshall Plan loan was to be allocated. In point of fact, Marshall Aid for the Laurium area began in 1949.

Since that article appeared, *E.C.A. Mission to Greece Bulletin No.* 1183 of January 16, 1952, has pointed out that during the first nine months of 1951 Greek production of fourteen basic minerals, most of them strategic metals of high importance to Western defence, nearly doubled the complete production for the entire preceding year.

During 1950, Greece produced 252,986 tonnes of the minerals and exported 206,598 tons at a value of $2,220,313. From January 1 through September 30 of 1951, Greece produced 439,315 tons and exported 372,088, at a value of $4,011,855. Total 1951 production figures will not be available for several weeks, but American mining advisors said it is safe to predict that the totals for the entire year will considerably exceed 200 per cent of 1950 production.

MINING OF PAYABLE DEPOSITS

The minerals specified include most of those which exist in Greece in quantities and qualities worth mining, so far as present geological surveys indicate. American economic aid and technical advice has played a large part in their development in recent years, and much of the exported minerals has gone to the Western defence effort. The list includes baryte, bauxite, emery and caustic magnesite; concentrates of pyrites, lead and zinc; and ores of antimony, chrome, copper, iron, iron-manganese, magnesite, and manganese.

The following table shows production in tons during the ten-year period 1929-1938. It presents also comparative tonnages for ores, kiln products and certain quarries for 1950 and 1951.

Mineral and Ore	*Output* 1929-1938 (*tons*)	*Output* 1950 (*tons*)	*Output* 1951 (*tons*)
Asbestos	154	30	34
Antimony	2,571	2,500	2,785
Barytes	131,323	20,799	29,836
Bauxite	446,985	77,448	163,656
Gypsum	66,716	82.0	950
Sulphate Ores	15,990	—	—
Combined Sulphates	435,305	7,092	84,100
Volcanic Earth	927,182	38,000	45,000
Kaolin	516	6,340	8,000
Pumice Stone	173,324	19,500 *	20,000 *
Magnesite	846,596	26,256 †	60,878 †
		9,586 ‡	26,068 ‡
Lignite	1,166,814	180,000	177,000
Manganese	22,270	—	—
Manganiferous Ores	—	2,780	3,900
Marble	9,734 *	640 *	1,639 *
Molybdenum	1,560	—	—
Nickel	251,768	—	—
Oil	3,715	—	—
Iron	2,157,317	4,623	52,825
Iron Pyrites	1,665,808	87,678	181,263
Emery	102,306	5,000	—
Steatite	7,526	2,500	2,623
Quartz	3,700	—	3,200
Copper	7,946	—	—
Chrome	269,650	12,630	25,333
Zinc	78,026	—	—
Zinc Concentrates	—	6,428	8,435
Ochres	2,000	—	—
Earth Colours	—	350	650
Pyrolusite	—	320	15,275
Arsenic Oxide	—	33	56
Lead	212,234	55,647	88,410
Lead Concentrates	—	1,665	4,852
Pure Lead	—	1,252	1,455
Ingot Lead	—	2,125	3,890
Sheet Lead	—	391	440
Litharge	—	137	169
Red Oxide	—	267	282
Amorphous Silica	—	—	4,000
Bentonite	—	—	1,300

*C.M. †Crude ‡Calcined

Post-war production has reached 80 per cent of the pre-war figure despite unfavourable conditions. It is estimated that production could exceed the pre-war figure by 60 per cent to 80 per cent if up-to-date machinery and other equipment could be installed.

The sub-soil of Greece contains a large variety of some thirty or more useful ores and minerals. The pre-war output of the Greek ore industry was about 1,000,000 tons.

The most important ore deposits so far found are barytes, bauxite, combined sulphuric lead-tin-iron, magnesite, molybdenum, nickel, iron, iron pyrites, emery and chrome. The most important minerals are gypsum, volcanic earth, marble and lignite (for fuel).

MINERAL AND ORE WEALTH BY REGION

Region	*Minerals or Ores*	*Main Deposits*
Attica	Zinc, Lead, Iron Ores, Combined Sulphates, Bauxite, Lignite, Marble	Combined Sulphates Bauxite (Laurium mines). Lignite, Marble
Boeotia.....		Nickel, Iron Ores
Phthiotis-Phocis	Lignite, Bauxite	Bauxite
Euboea	Iron Ores, Chromites, Bauxite, Lignite, Magnesite	Bauxite, Lignite, Magnesite
Aetolo-Acarnania...	Manganese, Iron Ore, Sulphur, Asphalt	
Argolis	Manganese	
Corinthia	Manganese, Iron Ore, Iron Pyrites, Marble	
Achaia	Lignite, Manganese	
Elia	Oil, Lignite	Lignite
Arcadia.....	Marble	
Laconia.....	Marble, Copper, Lignite, Iron Ores, Lignite Deposits	Lignite deposits, Iron Ores
Messinia	Iron Ores, Marble, Lignite, Manganese, Copper	
Larissa	Marble, Chromite, Asbestos	
Magnesia	Chromite, Zinc, Copper	
Trikalla.....	Chromite, Iron Ores	
Karditsa	Lignite	
Zante	Rock Salt, Sulphur, Oil	
Cyclades	Marble, Talc, Lead, Manganese Barytes, Kaolin, Quartz, Sulphur, Zinc, Iron Ores, Emery, Bauxite, Volcanic Earth	Iron Ores, Emery Bauxite, Volcanic Earth
Salonika	Chromite, Marble, Talc	
Pelli	Molybdenum, Manganese, Iron Ore, Chromite	
Amathela	Iron Pyrites, Chromite, Marble	
Vlorina	Lead, Copper, Iron Ore, Molybdenum, Chromite, Lignite	Lignite
Rhodopi	Combined Sulphates, Lignite, Lead, Asbestos, Quartz	
Xanthi	Lignite	
Evrus.....	Gold, Titanium, Barytes, Manganese, Chromite, Combined Sulphates, Lignite	Combined Sulphates Lignite
Janina	Lignite, Lead, Barytes	
Arta	Rock Salt, Lignite	
Lesbos	Iron Ore, Marble, Magnesite	Magnesite
Chios	Lignite, Marble, Antimony	Lignite Deposits
Samos	Emery, Lead, Bauxite, Asbestos, Iron Ore	
Kastoria	Chromite, Lignite	Lignite
Kilkis	Gold, Antimony, Wolfram	
Chalkidice ...	Bauxite, Iron Ore, Chromite Manganese, Magnesite, Combined Sulphates	Magnesite, Combined Sulphates
Serres	Gold, Iron Ore, Lignite	Lignite
Drama	Manganese, Asbestos, Marble	
Kavalla.....	Lignite, Lead, Iron Ore, Manganese	
Katerini	Lignite	
Canea	Lignite, Iron Ore, Gypsum	
Rethymno ...	Talc	
Lassithion ...	Talc, Iron Ore	
Herakleion ...	Iron Ore, Lignite	
Dodecanese ...	Lead, Iron Ore, Manganese, Lignite, Gypsum, Chromite	

The Greek sub-soil also contains precious metals (gold, platinum, osmium, iridium, palladium, etc.) and rare metals (uranium, thorium, demetrium, lanthanum, etc.).

THE CASE FOR LIGNITE

Lignite was the most important single development in the mining field during the year. Extensive developments are under way, and lignite is expected to replace solid fuel imports. Production is expected to reach 3,000,000 tons in 1954 as compared with the present 150,000 tons annual output. Extensive oil explorations are also expected to be initiated this spring through magnetometer work by air reconnaissance.

Reorganized Greek geological activities are progressing favourably. The first geological map of Greece is expected, and a number of publications covering completed geological studies of mineral areas have been printed. No important new discoveries have been made, but known areas of significance are being investigated under plans for development.

The minerals industry in Greece has been encouraged by American financial aid, technical assistance and foreign capital which is now bringing greatly increased production.

TECHNICAL BRIEFS

Use of Physics to Solve Mine Problems

A scientific method of designing safe and economical underground structures, such as tunnels, mine rooms, and slopes, may soon be provided by a new type of centrifugal testing apparatus developed in the Eastern Experiment Station of the U.S. Bureau of Mines. The new device, described in a report just issued, was constructed as part of the Bureau's programme of applying the principles and techniques of physics to mining problems. It operates on the principle that centrifugal forces generated by rapid rotation of a test model produce strains equivalent to those created in a mine opening by the pressure of the surrounding formations. A unique feature of the device is its use of resistance strain gauges to measure directly the amount of distortion in the rotating model.

According to the Bureau's report, this use of resistance strain gauges makes it unnecessary to test a model to destruction, and besides saving time and labour in preparing and testing models, makes it possible to apply test results to any underground structure similar to the model, regardless of dimensions or materials. Scientists using the apparatus to study a given ground-control problem can find a solution applicable to a number of mines operating in physically similar deposits.

Other advantages noted are that the model can be made of material different from that of the prototype, that effects of changes in one or more variables can be studied by performing a series of tests on a single model, and that the state of strain can be determined in the test model. The Bureau is now using the apparatus in testing models of bolted mine roofs.

Canada's First Sulphur from Petroleum Plant

At Jumping Pound, bordering the foothills of Alberta, now an outstanding and increasingly important oil producing region, Canada's first plant producing sulphur from petroleum was recently brought into operation. Ancillary to Shell's natural gas plant and costing nearly $Can.400,000, this new project is designed to recover sulphur at a rate of more than 10,000 tons per annum. Under an arrangement between Shell and the Powell River Co. in British Columbia, the latter concern will purchase Jumping Pound's entire sulphur production for distribution to Pacific Coast pulp and paper manufacturers.

The sulphur, of a very high grade of purity, is derived from hydrogen sulphide removed from the natural gas in the scrubbing plant. The finished product is piped from the plant to large vats, where it cools and solidifies. When a vat is full, its steel plates are stripped away, leaving a solid block of the yellow chemical. Shot holes are then drilled in the block, and the sulphur is broken up and collected for shipment.

At the official opening earlier this year, it was announced that the gas plant itself, which began production about a year ago, is to be expanded by over one-third of its present capacity of 25,000,000 cu. ft. of natural gas daily, and will soon be supplying an additional 10,000,000 cu. ft. per day for domestic and industrial use in Alberta. This is complementary to further drilling in the immediate vicinity.

Coating Iron Ore with Aluminium in Norway

The Norwegian firm, Mandal Staal A/S, has obtained the rights in Norway of an American patent for coating iron wire with aluminium, states a report recently received from Reuter from Oslo. It is understood that Mandal Staal A/S is the first firm in Europe to have negotiated such a contract. Raw materials for this work will be provided from local production.

METALS, MINERALS AND ALLOYS

The cry that America is now a "have-not" nation in respect of raw materials, which has been put so forcibly in the Paley Report, was echoed this week by Mr. Pehrson, of the U.S. Bureau of Mines, when he stated that the United States is only self-sufficient in nine out of the 38 principal industrial minerals. In the case of 12 of these minerals, he said that the U.S. produces less than 10 per cent of its requirements. Stressing the country's increasing dependence on foreign sources of supply as its rate of industrial expansion continued, he pointed out that "experience in two world wars has provided ample evidence of the unreliability of ocean-borne supplies in times of emergency." "Recent events," he added, "demonstrated that the nation cannot always rely on foreign sources of supply even in times of peace."

The director of the U.S. Office of Price Stabilization predicts that the recent steel price increase of $5.20 per ton will result in an increase in costs to the average American family of $100 a year. He clearly expects the new steel price to touch off a further round of inflation. First signs of this are to be seen in the coal industry where Mr. John Lewis is reported to have served notice of intending to reopen negotiations for yet another wage increase. Terms of the Alcoa wage settlement are reported elsewhere.

The American Iron and Steel Institute estimated that the production of steel in the U.S. in the current week would be 1,737,000 tons, or 83.6 per cent of rated capacity, as compared with 891,000 tons, or 42.9 per cent, last week.

A new freedom has been granted to dealers in certain raw materials from the dollar area. Until further notice they may buy these materials with dollars and sell them in the E.P.U. countries, including the financial areas of Belgium, France, Italy the Netherlands and Portugal. The reason for this relaxation—as with the resumption of lead dealings on the Metal Exchange—is because E.P.U. currencies are now "hard"; *i.e.* the U.K. deficit with E.P.U. has reached the stage where further deficits have to be paid in gold. Any reduction in the E.P.U. deficit would compensate for the loss of dollars, and some benefit should accrue to this country by way of profits or commission on the deal. The relaxation may be withdrawn, ironically enough, when the position with E.P.U. improves. Raw materials which are allocated by the International Materials Conference are excluded from this change.

COPPER.—Shortly after we went to press last week the Ministry of Materials announced a new agreement with the Commonwealth copper producers which provided that from August 1 the Ministry would reduce its bulk buying price by £1 12s. a ton to £268 a ton. This is equivalent to 33.5c. a lb. against the figure of 33.7c. paid during July. At the same time the Ministry's selling price was reduced £2 a ton to £285. Both buying and selling prices are to remain unaltered for at least six weeks and thereafter until any of the parties concerned give notice of a desire to re-negotiate. From the point of view of the producers, this announcement means a continuation for at least a similar period of the £44 a ton advance in price granted to them some six weeks ago. While this is a fair reflection of the world copper price outside the States and is one which does not place British users at a disadvantage compared with continental manufacturers, they must remain at a disadvantage vis-a-vis the United States so long as manufacturers there continue to benefit from the lower domestic price of 24½c. which gives them an average price on all copper used of about 29c. per lb. or £232 per ton.

LEAD.—During the discussions which are to take place on the manner in which the London market is to operate, some attempt will probably be made to rectify the deficiency in the pre-war contract. The old definition of "good soft pig lead" often gave rise to dissatisfaction because of its vagueness, and some tighter definition seems desirable.

The stock position will give cause for a great deal of thought. Naturally, the trade will have to wait for a while before knowing what the Government will do about present stocks. These are sufficiently large for the allocation of a large tonnage to be made available to the market. Such an allocation would be an improvement over the method adopted when the tin market re-opened and stocks were released in small quantities. This aspect of the stock position is, however, not the only one. Consumers will have to become used to the new conditions. For a long time, the Government has been holding stocks for the whole industry, but consumers will have to take this function over for themselves, and this could become a costly business even though the price of lead has been falling. The holding of stock in small parcels might lead to the need for holding a larger aggregate tonnage than under the old system, unless the consumers or the producers agree to establish central stocks. It should not be forgotten, however, that under any rationing scheme there is a tendency, once conditions begin to ease, for users to continue to take up their full ration as a precaution even though they may not immediately require it and there is no doubt that this factor has influenced the rising inventories.

So far the official announcements have been concerned with virgin metal, and the greater freedom to deal in scrap and residues under licence has yet to be restored. The suggestion has been made, however, that the development of the refining industry in this country has been officially encouraged and that this attitude might cause the authorities to be tougher over the export of scrap.

TIN.—In a statement to the Commons last Friday, in the course of which the Secretary for Overseas Trade indicated it was the Government's intention "to restore the freedom of the London Metal Exchange completely," he revealed that the U.K. Government had now virtually completed purchases of the 20,000 tons of tin it undertook to supply at the beginning of January in the steel-and-aluminium-for-tin agreement. Although when the agreement was made considerable anxiety had been expressed as to the loss the British Government might have to face on the transaction, the actual loss is not expected to exceed £150,000 against a budgeted loss of £750,000.

At the time of this agreement the R.F.C. had undertaken to refrain from bidding in the open market, an undertaking from which it is now freed by this announcement. Simultaneously with this development the N.P.A. has allowed the resumption of private importation of tin into the States. At present the allocation order on use remains unchanged although it is stated that the relaxation of this will be considered as supplies improve. American importers were pointing out this week that the immediate effects of a return to private buying would be slight because as tin continued to be allocated to consumers' demands, dealings would be practically confined to spot tin of which the R.F.C. must continue for some weeks to be the only stockholder.

In any event, it would seem that private trading must be limited until the end of next year by the extent of the R.F.C's outstanding Belgian and Indonesian contracts which between them will supply about 30,000 tons next year. With this tonnage of metal assured at a fixed price of 121¼c. c.i.f., it seems pretty certain that this will, in effect, be a ceiling price for the time being and that the extent of private trading will depend on the importers ability to buy below this figure. With the Bolivian contract still under consideration, it will be interesting to see whether the R.F.C. will now conduct these negotiations direct or will leave it to the trade to obtain the necessary tonnage for the Texas smelter.

Meanwhile the cessation of U.K. Government buying coupled with the failure of the R.F.C. to re-enter the market as a buyer has had a depressing effect on the market, which has fallen £46 from the figure at which it stood a week ago.

ZINC.—Although the International Materials Conference estimates that the smelter production of zinc in the third quarter of the year at 495,000 tonnes will be slightly below the level of the second quarter, demand and supply will be practically in balance. A smelter production of 428,000 tonnes of lead in the third quarter will be in excess of requirements. These estimates have been based on the data submitted by member governments.

Support is lent to these estimates both in this country and in the States. In the latter, smelter stocks at the end of last month are believed to have reached 100,000 tons. On Thursday the price of spot zinc, East St. Louis, eased to 13½c. per lb., against a flat 15c. previously.

ALUMINIUM.—The price of aluminium in the U.S. is being increased by an average of 5½ per cent. Aluminium in ingot and pig iron form will rise by 1c. per lb. and semi-manufactured and manufactured products will increase by about 5 per cent. These increases which will mean dearer prices for the industry are only about one-half of those claimed by the industry.

The threatened strike of workers at nine plants at Alcoa has

been settled on the basis of a pay increase of about 21c. per hour. The workers at the remaining Alcoa plants had already settled with the employers through a different union.

CADMIUM.—The New York price of cadmium has fallen from $2.25 to $2.00 per lb. The London price for Empire cadmium is also down to 14s 4d. per lb., while the greatly improved statistical position here has almost eliminated the premium on non-Empire metal.

The production of primary cadmium in the U.S. fell by 10 per cent in 1951, but restrictions on the use of the metal imposed by N.P.A., cut consumption by 25 per cent. As a result of these changes stocks of the metal increased by 76 per cent. Instead of importing 134 s.tons as in 1950 the U.S. was able to export 258 s.tons in 1951.

The London Metal Market

(From Our Metal Exchange Correspondent)

Last Thursday evening it was announced that the private importation of tin into the United States would be permitted, becoming effective on August 1, but that allocations by the N.P.A. would continue and the R.F.C. would still be a seller to consumers at 121½c. per lb. Following this statement it transpired that the R.F.C. had withdrawn as buyers at around 120c. and consequently the cheap sterling deals by which Straits Tin was finding its way via the Continent to New York, will probably cease or be very much curtailed owing to the inability of operators to know at what price their tin would be saleable there. In the meantime the c.i.f. Europe price of Straits Tin has fallen since Thursday last to the time of writing by about £34 per ton, whilst in London the price of Standard Tin has declined by an almost similar amount in the same period. It may be that the Government were not buyers when the Straits market re-opened after the holiday and there is no indication as to whether support will be forthcoming from that quarter should the decline continue. The possibility of Government purchases to replace material shipped from this country early this year, or for political reasons, still remains.

The free market European price of lead has advanced from £115 to £120-125, whilst in zinc, following the settlement of the American steel strike, the cheap offerings have disappeared and the price is now £120 or near. The free price of copper in America is between 36c. and 36½c. per lb. The Belgians continue selling limited quantities at 34½c., whilst most other sellers in Europe are quoting 35c. to 36c. per lb.

On Thursday the official close on the tin market was: Settlement price £918, Cash Buyers £917 10s., Sellers £920; Three months Buyers £918, Sellers £920. In the afternoon the market was easier. Turnover for the day was 380 tons. Approximate turnover for the week was 910 tons.

The Eastern price on Thursday morning was equivalent to £939 10s. per ton, c.i.f. Europe.

Iron and Steel

The horizon for steel is distinctly brighter. Users may have to wait until October before they get the full benefit of increased supplies, but the most acute phase of the shortage is nearly at an end. Home production—still retarded by the holidays—is expected to stage a quick recovery when the holidays are over, and imports from U.S.A. and also from Western Europe are on an impressive scale. Throughout the period of the American strike, shipments of U.S. steel to the U.K. were never wholly suspended, and the Federal Commerce Department having now announced the removal of all bans upon the export of controlled steel material, it is expected that clearances to British ports will be accelerated.

The spread of import restrictions in so many overseas markets has also had the effect of increasing the interest of European exporters in British requirements. There has been a noticeable expansion of deliveries of steel—chiefly in the form of billets and sheet bars—from Belgium and Luxembourg which promises more regular employment for the mills engaged on the production of sheets, light sections and small bars.

The purchase of foreign steel however imposes a strain upon our external balances which must obviously be stopped at the earliest possible moment or at least reduced to a smaller scale, and this may soon be possible.

Steel smelters have been building up their stores of fuel and ore, and the rising scale of pig iron production promises to give a welcome impetus to the ingot output, which is all that is needed to restore the heavy rolling mills to full scale activity. (Even scrap supplies are rather more plentiful.) In this case, of course, the improvement is only relative. All the works are open to receive unlimited tonnages of good heavy material. But improvement of supplies embrace both imports and home collections and here and there it has been possible to increase the dimensions of the stockpile.

The steel export trade is still rather quiet, but makers experience no difficulty in disposing of maximum outputs since there is an enormous unsatisfied demand for all description of iron and steel in the home market. Pressure for prompt deliveries of pig iron has eased a little owing to the holidays, but available tonnages are certainly not in excess of the requirements of the iron foundries.

PRODUCTION OF TIN CONCENTRATES — JUNE
(long tons)

	June, 1952	*Jan.-June*, 1952	*Jan.-June*, 1951
Belgian Congo ...	1,311	6,863	6,607
Bolivia*	*2,978a*	*13,495b*	*14,344c*
Indonesia	2,964	15,891	15,138
Malaya	4,678	28,200	28,015
Thailand	770	4,303	5,640

Source: International Tin Study Group. *Exports. *a*—May, 1952. *b*—Jan.-May, 1952. *c*—Jan.-May, 1951.

AUGUST 7 PRICES

COPPER

Electrolytic ... ... £285 0 0 d/d

TIN

(See our London Metal Exchange report for Thursday's prices)

LEAD

Soft foreign, duty paid ... ... £131 0 0 d/d
Soft empire ... ... £131 0 0 d/d
English lead ... ... £132 10 0 nom.

ZINC

G.O.B. spelter, foreign, duty paid ... £130 0 0 d/d
G.O.B. spelter, domestic... ... ... £130 0 0 d/d
Electrolytic and refined zinc ... ... £134 0 0 d/d

ANTIMONY

English (99%) delivered, 10 cwt. and over ... ... £225 per ton
Crude (70%) ... ... £210 per ton
Ore (60% basis) ... ... 25s.—27/6 nom. per unit, c.i.f.

NICKEL

99.5% (home trade) ... ... £454 per ton

OTHER METALS

Aluminium, £157 per ton.
Bismuth, 19s. lb.
Cadmium, (Empire) 14s. 4d. lb.
Chromium, 6s. 5d. lb.
Cobalt, 20s. lb.
Gold, 248s. f.oz.
Iridium, £65 oz. nom.
Magnesium, 2s. 10½d. lb.
Manganese Metal (96%-98%) 2s. 2d./2s. 3d. per lb. d/d
Osmiridium, £35 oz. nom.
Osmium, £70 oz. nom.
Palladium, £8 10s. oz.
Platinum, £27/33 5s. nom.
Rhodium, £45 oz.
Ruthenium, £30 oz.
Quicksilver, £65/£65 10s. ex-warehouse
Selenium, 25s. nom. per lb.
Silver 73d. f.oz. spot and f'd.
Tellurium, 18s./19s. lb.

ORES, ALLOYS, ETC.

Bismuth ... ... 60% 10s. lb. c.i.f.
50% 9s. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (lumpy) £14 2s. per ton c.i.f.
" " (concentrates) £14 2s. per ton c.i.f.
" " Refractory £13 14s. per ton c.i.f.
Baluchistan Metallurgical ... £15 8s. per ton c.i.f.
Magnesite, ground calcined ... £26 - £27 d/d
Magnesite, Raw ... ... £10 - £11 d/d
Molybdenite (85% basis) ... 104s. 9d. per unit c.i.f.
Wolfram (65%), U.K. ... 425s. nom. c.i.f.
Tungsten Metal Powder (for steel manufacture) ... 32s. 9d. nom. per lb. (home)
Ferro-tungsten ... ... 29s. 9d. nom. per lb. (home)
Carbide, 4-cwt. lots ... ... £30 3s. 9d. d/d per ton
Ferro-manganese, home ... £43 15s. 2d. per ton
Manganese Ore U.K. (48%-50%)... ... ... 72d. per unit
Brass Wire ... ... 2s. 9½d. per lb. basis.
Brass Tubes, solid drawn ... 2s. 3½d. per lb. basis.

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The period under review included the August Bank Holiday, traditionally a slack time for the stock markets. While little trading was reported, there was a marked general improvement in prices in the new week. The balance of payment figures created a distinctly better atmosphere in the gilt-edged section. The Corporation of Johannesburg has been forced to issue a 5 per cent stock at 98 in a cash and conversion operation—an unenviable distinction which can certainly be partly attributed to the disturbed political condition in the Union.

Kaffir shares, while quiet, remained steady and there were several interesting features. West Rand Consols were again favoured following the report that uranium production would be commenced at an early date. West Rand Investment Trust finished better at 33s. 1½d. after having touched 34s. Luipaards Vlei jumped 1s. on persistent rumours that the company might become a uranium producer. Optimists for the future of gold shares point to the increased dollar premium on the free gold markets and also to the fact that sterling has slightly depreciated against the dollar. It is also hoped that some decrease in mining costs may be felt during the next year. There is now considerably more competition between the producers of mining machinery. Another point considered favourable is the strong gold backing of the South African pound.

O.F.S. issues fell away following the announcement that Free State Geduld is to offer shareholders one new 5s. share at 45s. for every six held. It is anticipated that the milling of development ore will start about the middle of 1953. Exceptionally in this section, Virginia Gold improved following the June quarterly report. The limited amount of reef sampled in No. 1 shaft gave 100 per cent payability with values averaging 456 in.-dwt. Welkom fell as a result of the mishap in the shaft announced by the company last week.

In the Australian gold market Sons of Gwalia fell to 7s. following the report, but later recovered. There was a debit balance of £7,093 against a profit last year of £62,653. The amount brought forward wiped out this deficit and left a credit of £19,654. New articles are proposed including increased borrowing powers.

Copper shares were one of the brightest features. All round improvement was recorded on the new agreed price for the metal which, it is hoped, will have a steadying influence. The rise was especially marked in Rio Tintos. Tanks announced that the Earl of Selborne and Sir Ulick Alexander have been appointed directors. It is thought that Sir Ulick may assume the chairmanship which has now been in suspension for some time.

Tin shares in both sections fell away. The price of the metal weakened during the past week and the new U.K. and U.S. policies make the future a little uncertain. Exceptionally, British Tin Investment improved due to reaction after last week's heavy fall.

Among miscellaneous base metals, asbestos shares were firm. Cape Asbestos announced that the new subsidiary, Marinite, will have a capital of £562,400. It had been expected that this company would only be capitalized to £350,000. Presumably it is thought that there will be an even greater scope for the product than had been originally anticipated. With shipbuilders' order books full, this seems likely. Platinum shares tended to be rather easier. It is reported that the free market price of the metal has fallen. Wankie Colliery were again in the news. Their new water supply system from the Zambesi, which involves pumping water over a distance of more than thirty miles, was opened by the Prime Minister of Southern Rhodesia. The scheme cost nearly £700,000.

Oil shares had a good week. The continuing expansion and demand for petroleum products is an encouraging factor. Kern Oil jumped following New York buying and finished the week at 16s., a rise of 1s. 3d.

In the dollar share market, International Nickel fell half a point after the declaration of an interim dividend of 50c. U.S. currency. This is the third interim of this amount that has been declared in respect of 1952. In 1951, a total of 2.60 was paid comprising two interims of 40c., two of 50c. and an extra payment of 80c. per share.

	Price Aug. 6	+ or — on week
FINANCE		
African & European	2½	— ¼
Anglo American Corpn.	6½	+ ¼
Anglo-French	20/-	−7½d
Anglo Transvaal Consol.	25/-	
Central Mining (£1 shrs.)	37/6	+7½d
Consolidated Goldfields	45/-	
Consol. Mines Selection	25/-	−7½d
East Rand Consols	2/7½	
General Mining	4⅜	+ ⅛
H.E. Prop	31/10½	−1/3
Henderson's Transvaal	9/9	+3d
Johnnies	2⅜	— ⅛
Rand Mines	4½	
Rand Selection	41/10½	+1/1½
Strathmore Consol.	28/9	
Union Corp. (2/6 units)	35/7½	+1½d
Vereeniging Estates	3⅛	
Writs	33/1½	+7½d
West Wits	44/4½	−1½d
RAND GOLD		
Blyvoors	44/3	−3d
Brakpan	18/3xd	+6d
City Deep	34/4½	
Consol. Main Reef	33/9	
Crown	45/-	+7½d
Daggas	3⅜xd	+ ⅛
Doornfontein	27/9	+6d
Durban Deep	3⅛	+ ⅛
E. Daggas	19/-xd	−3d
E. Geduld ... (4/- units)	47/6	+9d
E. Rand Props	4⅛	
Geduld	6⅛	
Govt. Areas	12/3xd	+9d
Grootvlei	31/-xd	
Libanon	13/4½	+1½d
Luipaards Vlei	21/-	+1/-
Marievale	21/9	+6d
Modderfontein East	23/9	
New Kleinfontein	28/1½	−7½d
New Pioneer	14/3	
Randfontein	23/-	+1/6
Robinson Deep	12/3	+3d
Rose Deep	26/3	
Simmer & Jack	6/3	+4½d
S.A. Lands	40/-	
Springs	7/6	
Stilfontein	26/3	
Sub Nigel	2⅛	+ ⅛
Van Dyk	12/6	−3d
Venterspost	19/7½	−1½d
Vlakfontein	17/9	+4½d
Vogelstruisbult	28/9	+3d
West Driefontein	6⅛	
W. Rand Consolidated	53/1½	+7½d
Western Reefs	42/9	+3d
O.F.S.		
Freddies	6/9	−6d
Freddies N.	6/6	−3d
Freddies S.	6/7½	−4½d
F.S. Geduld	2⅛	— ⅛
Geoffries	16/6	
Harmony	19/-	
Loraine	6/10½	−3d
Lydenburg Estates	10/6	
Merriespruit	4/-	+3d
Middle Wits	15/6	
Ofsits	38/9	−6d
President Brand	20/-	−6d
President Steyn	17/3	−4½d
St. Helena	16/9	−3d
U.F.S.C. & G.	6/6	
Virginia Ord.	11/9	+9d
Welkom	25/-	−1/-
Western Holdings	3⅜	— ⅛
WEST AFRICAN GOLD		
Amalgamated Banket	1/4½	
Ariston	5/4½	+1½d
Ashanti	17/6	+6d
Bibiani	6/4½	+1½d
Bremang	2/6xd	
G.C. Main Reef	3/7½	
G.C. Selection Trust	6/7½	+1½d
Konongo	2/6	
Lyndhurst Deep	1/1½	
Marlu	1/1½	
Taquah & Abosso	3/3	+3d
AUSTRALIAN GOLD		
Boulder Perseverance	2/6	
Gold Mines of Kalgoorlie	9/9	
Great Boulder Prop	5/6	+1½d
Lake View and Star	16/3	
Mount Morgan	19/9	+1/3
North Kalgurli	12/3	−3d
Sons of Gwalia	8/-	
South Kalgurli	8/3	
Western Mining	8/6	+3d
MISCELLANEOUS GOLD		
Cam and Motor	40/-	
Champion Reef	7/-	+3d
Falcon Mines	8/7½	
Globe & Phoenix	24/6	
G.F. Rhodesian	6/6	
London & Rhodesian	4/6	
Motapa	2/1½	
Mysore	3/9	
Nundydroog	5/9	
Ooregum	2/9	−1½d
Oroville	11/3	
MISCELLANEOUS GOLD (contd.)		
St. John d'El Rey	24/6	+6d
Zams	38/6	+1/6
DIAMONDS & PLATINUM		
Anglo American Inv.	4⅜	+ ⅛
Casts	29/-	+3d
Cons. Diam. of S.W.A.	4	— ⅛
De Beers Defd. Bearer	56/9	+1/3
De Beers Pfd. Bearer	14	
Pots Platinum	10/-	+4½d
Watervaal	16/-	
COPPER		
Chartered	60/3	+6d
Esperanza	3/10½	−3d
Indian Copper	4/-	+3d
Messina	4⅜	+ ⅛
Nchanga	7⅜	+ ⅛
Rhod. Anglo-American	60/9	+4/3
Rhod. Katanga	12/10½	
Rhodesian Selection	18/-	+10½d
Rhokana	22½	+1½
Rio Tinto	26½	+2½
Roan Antelope	14/3	+7½d
Selection Trust	42/6	
Taaks	67/-	+5/9
Tharsis Sulphur Br.	42/6	
TIN (Eastern)		
Ayer Hitam	24/9	+3d
Bangrin	7/3xd	−6d
Gopeng	10/7½	−1½d
Hongkong	6/6	−3d
Ipoh	20/9	−6d
Kamunting	11/-	−3d
Kepong Dredging	7/3	−3d
Kinta Tin Mines	13/3	−3d
Malayan Dredging	20/9	+3d
Pahang	15/3	−1½d
Pengkalen	10/-	−3d
Petaling	14/6xd	−1½d
Rambutan	11/9xd	−3d
Siamese Tin	18/9xd	−1/3
Southern Kinta	15/10½	−1½d
S. Malayan	23/9	−9d
S. Tronoh	14/3	−6d
Sungei Kinta	16/10½	−7½d
Tekka Taiping	7/3xd	−9d
Tronoh	23/9	−3d
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	10/6	+1½d
Beralt Tin	21/6	
Bisichi	4/1½	
British Tin Inv.	15/-xd	+6d
Ex-Lands Nigeria	4/10½	−1½d
TIN (Nigerian and Miscellaneous) contd.		
Geevor Tin	12/-	−3d
Geld & Base Metal	3/1½	−3d
Jantar Nigeria	8/10½	
Jos Tin Area	10/-	
Kaduna Prospectors	3/9	
Kaduna Syndicate	5/4½	+1½d
London Tin	5/4½xd	−3d
United Tin	2/4½	−1½d
SILVER, LEAD, ZINC		
Broken Hill South	47/6	−6d
Burma Corporation	1/9	
Consol. Zinc	28/9	−1½d
Lake George	15/3	−4½d
Mount Isa	36/3	+1/-
New Broken Hill	27/6	−6d
North Broken Hill	55/9	
Rhodesian Broken Hill	16/6	+1½d
San Francisco Mines	31/-	−3d
Uruwira	5/-	
MISCELLANEOUS BASE METALS & COALS		
Amal. Collieries of S.A.	47/6	
Associated Manganese	45/-	+1/6
Cape Asbestos	18/-	
C.P. Manganese	47/-	−3d
Consol. Murchison	27/6	
Mashaba	8d	
Natal Navigation	3⅜	
Rhod. Monteleo	13/6	+3d
Turner & Newall	83/9	+1/3
Wankie	20/3	+1/3
Witbank Colliery	2⅜	+ ⅛
CANADIAN MINES		
Dome	$37	
Hollinger	$31½	+$1
Hudson Bay Mining	$117	
International Nickel	$85½	−$½
Mining Corpn. of Canada	£5⅜	−£⅛
Noranda	$160	+$3
Quemont	£8⅛	+£½
Yukon	4/3	+1½d
OIL		
Anglo-Iranian	5⅜	— ⅛
Apex	44/4½	+1/3
Attock	23/1½	+1/1½
Burmah	86/10½	+1/10½
Canadian Eagle	36/-	+3d
Mexican Eagle	22/4½	−6d
Shell (bearer)	4½	+ ⅛
Trinidad Leasehold	29/3	+9d
T.P.D.	29/4½	−1/3
Ultramar	27/1½	+6d

RAND AND O.F.S. QUARTERLY REPORTS

The footage of development accomplished by the mines of the Rand and O.F.S. during the June quarter was, for the most part, in advance of that for the previous three months.

The majority of working profits of the Rand producers were lower and revenue from premium gold sales was less than in the preceding three months even after allowing for the inclusion in the figures of an income adjustment for the small variations in official gold price during the six months to end-June. These resulted from fluctuations in the sterling-dollar rate within the limits allowed by the Treasury. From July the necessary adjustments of revenue are being made in the monthly returns.

There is still not sufficient evidence to say with assurance that the persistent uptrend in working costs, which has siphoned off so considerable a part of the benefits of the 1949 devaluation, has been stopped. But it is becoming tolerably certain that such deflationary indications, as have been seen in recent months, may now begin to seep through to the Rand producers. If present trends continue, more positive indications can reasonably be looked for during the coming months.

Those companies which strike their balance mid-year have given a re-estimate of ore reserves. They tell the familiar story of pay values having to be up-graded at the expense of tonnage in consequence of the rise in working costs.

MINING OPERATIONS IN THE ORANGE FREE STATE

Mining work on the various properties in the Free State gave satisfaction during the quarter and more positive results are now beginning to be seen. On the whole developments have tended to outstrip borehole results so far as reef values are concerned.

Of the seven members of the Anglo American group, Welkom Gold announced slightly lower development values, though the average grade of ore exposed continues to be consistent. The percentage payability during the quarter was 64 per cent.

A large part of the underground work at Western Holdings was off reef, but of the 270 ft. of Basal reef sampled, 93 per cent was payable averaging 79.69 dwt. gold per ton over a channel width of 10.78 in., equal to 859 in.-dwt. The drive has been started from the No. 1 shaft towards the company's northern boundary about three-quarters of a mile away.

Free State Geduld reported shaft sinking progress and confirmed the intersection of the Basal reef. Work in connection with the erection of the milling plant is going steadily forward.

There was a little disappointment that the high values encountered in the President Steyn No. 2 shaft during the early part of the quarter, were not followed by news of development on the reef. Equipment of the shaft and station cutting was reported, as was the progress made with the erection of the plant. Confirmation of the intersection of the Basal reef in President Brand No. 1 shaft was announced and also the progress made with No. 2 shaft.

The sinking of the Loraine No. 2 shaft proceeded apace during the June quarter and advanced a further 940 ft. The "B" reef was cut in No. 1 shaft at 4,157 ft. Sections sampled round the perimeter assayed 1.33 dwt. over 40 in. At the end of June the shaft was 4,339 ft. deep.

St. Helena (Union Corporation) reported payability from development which more than maintained the improved percentage of the previous quarter, namely 38 per cent against 36 per cent. Values were 16.4 dwt. over 20 in., equal to 328 in.-dwt. compared with 347 in.-dwt. in the March quarter.

While Freddies (Johnnies group) announced that a total of 6,839 ft. had been drilled on various farms, without very striking results, the two operating mines reported initial developments. Major part of work done was off reef but at Freddies North, Basal reef exposures on 16th level were encountered over a distance of 55 ft. in north crosscut averaging 12.8 dwt. over 31 in., equal to 397 in.-dwt.; in south crosscut exposures over 90 ft. gave 11.9 dwt. over 35 in., equivalent to 416 in.-dwt. At Freddies South No. 1 shaft, 102 ft. of Basal reef were exposed in a haulage immediately adjacent to the shaft and sampling of 100 ft. gave a value of 7.3 dwt. over 32 in. or 234 in.-dwt.

No new borehole results were revealed in "Geoffries" (General Mining) quarterly and only those subject to previous separate announcements were given.

Good development results were reported from the No. 1 shaft of Virginia (Anglo Transvaal). The limited amount of 255 ft. of reef sampled proved 100 per cent payable, with values averaging 456 in.-dwt.

RAND DEVELOPMENT RESULTS

Central Mining-Rand Mines Group.—Some interesting features presented themselves in the June quarterly reports of the Central Mining Rand producers. Of particular note was the big drop in Blyvoor's value, though pay ratio was still very good. More development was accomplished but a lower footage sampled —2,585 against 3,375 ft. Payability was 97 per cent against 94 but value went back to 499 in.-dwt. compared with 676 in.-dwt. in the March three months. The mine's new computation of ore reserves show an increase of 10,000 tons at 5,527,000 of 12.5 dwt., equal to about four years' mill feed.

There was a jump in East Rand Proprietary's pay ratio to 70 per cent from 57 previously, but the value of the larger footage of 4,240 ft. sampled was down to 344 against 407 in.-dwt. Durban Deep also recorded a lower value (294 against 335 in.-dwt.) with 59 compared with 57 per cent payability of the 11,640 ft. sampled.

Better results were obtained by Crown Mines. Of the lower footage sampled—13,380 against 13,830—48 per cent compared with 40 was payable giving a value of 283 (253) in.-dwt. The value of City Deep's 5,925 ft. sampled was better at 343 against 278 in.-dwt. but the pay percentage was slightly down at 35 (37).

Payability of the new ground sampled (9,280 against 7,130) by Consolidated Main Reef was the same as in the previous quarter, 46 per cent, with value of 250 (234) in.-dwt.

Both the value and pay ratio of the Rose Deep's footage sampled 8,740 ft. were lower but Welgedacht showed improvement, while Modder East reported better value and lower payability.

Anglo American Corporation.—The larger footage of work done by most of the Anglo American mines did not give consistent results. Whereas values were mostly down, there was some improvement in payability.

The pay ratio of the larger footage sampled (6,150 against 5,180 ft.) on Daggafontein's Main Reef Leader and (7,890 compared with 7,035 ft.) on Kimberley reef, was in both cases similar to the previous quarter, the value of the M.R.I. was down to 288 in.-dwt. against 319. Kimberley value rose from 446 to 459 in.-dwt. On East Daggafontein the values opened up on both reefs were lower but the pay ratio of the 5,245 ft. sampled on the Kimberley rose from 21 to 28 per cent.

Brakpan reported higher payability but lower value while Springs Mines was unable to maintain the previous quarter's figures, and new ground opened up on the Kimberley gave barren results. Both mines developed and sampled more ore.

There was little striking about South African Lands results; more development—21,428 ft. was accomplished and of the 13,190 ft. sampled, 42 per cent (against 41) proved payable with a value of 403 (426) in.-dwt.

A drop was registered in Western Reefs payability and value; of the 20,083 ft. developed, 9,160 ft. were sampled giving a pay ratio of 43 per cent (against 45) with in.-dwt. of 374 compared with 382. The company reported that it had done further development on the farm Goedgenoeg, which is outside its present mining lease. Of the 1,135 ft. of reef sampled, 63 per cent was payable averaging 26.26 dwt. over 27.26 in., or 716 in.-dwt. This new area promises to make a useful addition to the mine's life, with high value ore, and may ultimately justify a further addition to the milling plant.

Consolidated Gold Fields.—The returns of the operating companies of the Gold Fields made a mixed showing with unexpectedly good figures reported by some of the older members of the group.

There was room for satisfaction with the Doornfontein's resumed development from the Annan shaft. The major portion of the footage was off reef but 265 ft. were on reef, sampling giving 100 per cent payability with an average value of 9.9 dwt. over a stope width of 45 in. or 446 in.-dwt. West Driefontein also did well with maintained payability of 100 per cent and

values of 734 in.-dwt. The other two members of the Far Western Rand section—Venterspost and Libanon gave lower payability and values but on the latter mine the Contact reef showed up well. Of the 1,380 ft. sampled, 39 per cent was payable with an average of 6.0 dwt. over 77.3 in., or 464 in.-dwt. against 25 per cent and 326 in.-dwt. on this reef the previous quarter.

Robinson Deep's figures were surprisingly satisfactory. Of the 3,030 ft. sampled (against 2,125) 59 compared with 38 per cent proved payable with a value of 380 against 324 in-dwt. Although the pay ratio of the 7,780 ft. sampled on Simmer & Jack was lower at 39 per cent, value went up to 315 against 268 in.-dwt. the previous quarter. Luipaards payability and value were somewhat lower.

Of the Far Eastern Rand mines, Sub Nigel sampled 9,205 ft. for a slightly higher pay ratio but value rose to 374 (326) in.-dwt. The 8,705 ft. sampled on Vogelstruisbult gave a pay ratio of 50 (47) per cent with a value of 302 compared with 260 in.-dwt. Vlakfontein's increased footage sampled of 8,505 gave a pay ratio of 28 per cent and value of 314 in.-dwt.

Union Corporation.—Development footage of all the members of the Union Corporation was in advance of that of the March quarter and better values were shown in some cases with higher payability in others.

Of the 2,175 ft. sampled on East Geduld, the pay ratio rose to 52 per cent against 45, but value of 145 in-dwt. went against 185 in.-dwt. The Black reef of Geduld Proprietary did not show up so well; 2,815 ft. were sampled but only 21 compared with 39 per cent was payable, value being 201 (267) in.-dwt.

Grootvlei sampled a larger footage (9,800 against 8,585 ft.) the pay ratio of which was exactly the same as previously—55 per cent with the value increased to 220 in.-dwt.

Both the Main and Kimberley Reefs of Marievale opened up well; footage sampled on the former, 3,290 was rather less but payability of 49 per cent was well up to that of the previous three months' work, while value increased to 314 in.-dwt. compared with 277. The footage of payability on the Kimberley was better—20 per cent against 17—but the value of 200 in.-dwt. compared with 303.

Better No. 5 shaft area development results were reported by Van Dyk; indeed they were the best to date in this area which is so vital to the future of the mine. Of the 7,610 ft. sampled, 2,800 ft. were from the No. 5 shaft area, of which the payable reef disclosures were 1,160 ft., having an average assay value of 9.6 dwt. over 27 in.

Johnnies Group.—The showing made by the old mines of the Johannesburg Consolidated was much as expected both as regards developments and profits. A lower footage was sampled by all with the exception of New State Areas, which also announced better values; of the 1,907 (against 1,504) ft. sampled, 20 per cent proved payable and the value of 223 in.-dwt. went against 218 previously. The mine made a loss for the quarter of £2,400 (against £745), while premium gold of £6,995 compared with £8,917 in the March quarter. In contrast Government Areas quarterly profit rose to £130,920 (against £127,620), but, as with all the producers, premium gold income was down—£30,808 against £44,410. Developments were good; of the 7,350 ft. sampled (compared with 10,510 ft.), payability rose to 62 against 57 per cent and value to 245 in.-dwt. compared with 227.

Although East Champ d'Or footage sampled was only 575 (685), the pay ratio of 63 per cent was double that of the previous three months, with values slightly better at 189 in.-dwt.

Higher values and an improvement in payability were also announced by Randfontein. Footage sampled was 9,085 (12,620); pay percentage rose to 33 from 29 and the value to 302 against 234 in.-dwt. Of the 850 ft. sampled on Wit. Gold, 26 per cent was payable, value being 193 per cent.

General Mining.—Although West Rand's values again dropped, payability was not much altered. Of the 21,463 ft. developed, 9,520 ft. were sampled, of which 55 (against 54) per cent was payable, value being 281 in.-dwt. compared with 309 in.-dwt. The other group mine, South Roodepoort sampled 3,855 ft., of which 42 per cent was payable (32 per cent the previous quarter) and value was 272 in.-dwt. against 268.

Anglo Transvaal.—Developments on the Main Reef series of Rand Leases gave a lower payability, the percentage being 58 against 63 the previous quarter, while the value of 246 in.-dwt. went against 266 in.-dwt. Working profit was slightly down and the ore reserves of 4,133,000 tons of 4.33 dwt. were lower.

Strathmore.—Development on the Vaal reef horizon from Stilfontein's Charles shaft gave 79 per cent payability from 1,380 ft. sampled with values of 43.8 dwt. over 5.3 in., equal to 232 in.-dwt.

COMPANY NEWS AND VIEWS

Labour Shortage Upsets Sons of Gwalia

That the output of Sons of Gwalia during 1951 would show a decline compared with 1950 was anticipated by the company's chairman, Captain A. H. Moreing, in his statement at the Annual Meeting held in July, 1950. The figure he then gave was that first six months of the year 1951 output had dropped by 1,840 oz. compared with the corresponding period of 1950; but he was hopeful that a part of this would be made good during the remainder of the year, in fact, however, production fell by 6,442 oz. due to the breakdown of the crankshaft on the main winder and to the ensuing disorganization of operations.

Year to Dec. 31	*Milled (tons)*	*Grade (dwt.)*	*Yield (oz.)*	*Cost* per ton s. d.*	*Ore reserves (tons)*	*(dwt.)*
1950	101,112	5.1	25,628	48 10	593,530	5.54
1951	82,572	4.6	19,186	59 4	591,136	5.46

*Including development charges of 2s. 10d. per ton (1951—2s. 8d.)

In its essentials the disorganization of operations reduces itself to an aggravation of the existing labour shortage caused by part of the company's labour force drifting off elsewhere when the mine was shut down for 17 days while repairs were being carried out to the main winder. This shortage of labour still remains acute despite the company's vigorous recruitment campaign, locally and in Italy.

Indeed, it would appear that the disappointing operating results achieved during 1951 are traceable to the inadequate supply of labour, although as can be seen from the above table, the grade of ore sent to the mill also contributed to the lower output.

The impact of the lower grade of ore milled and the reduced tonnage throughput stands out clearly in the table below and calls for little comment.

Year to Dec. 31	*Gold Proceeds* £	*Mining Costs* £	*Tax* £	*Net Profit* £	*Dividend* %	*Carry forward* £
1950	318,750	242,804	35,000	62,692	20	26,786
1951	241,039	240,772	Nil	Dr.7,093	Nil	16,089

Development work carried out during the year was principally done on the new lodes in the hanging wall of the main lode between levels 26 and 31, and gave reasonable results. On level 27 drive north advanced 91 ft. to a total of 98 ft. in values averaging 3.2 dwt. over a width of 8 ft., while in a south drive the footage advanced amounted to 119 ft. to a total of 130 ft. in values averaging 4.2 dwt., over the similarly good width of 8 ft. It was on this level that the major proportion of driving was carried out during 1951.

The Annual Meeting will be held in London on August 26.

Geevor Pays Shareholders Same, but the Exchequer Less

Geevor Tin Mines have recommended a final dividend payment of 1s. 9d. making, with the interim dividend of 9d., a total distribution of 2s. 6d. per 5s. stock unit on the £103,000 issued capital, the same as for 1951.

Details of the company's operating profit and appropriations, announced in a preliminary statement and summarized in tabular form below, show that although profit before tax declined by some

£24,000 the tax man, for a change, was the one to feel the draught rather than the shareholders.

Year to Mar.31	Working Profit	Tax	Net Profit	General Reserve	Dividend	Carry forward
	£	£	£	£	%	£
1951	246,906	147,255	99,651	64,396	50	9,503
1952	222,825	126,801	96,024	61,654*	50	9,630

*Includes £20,000 provided against loss on investments.

The company appears to be pressing on with its policy of strengthening its reserves to meet the expenditure anticipated in its future development programme. No doubt the allocation to general reserve would have been higher but for the necessity to provide against the market decline of its investments. The Annual General Meeting will be held in London on September 23.

Lake George to Stay in the U.K.

The shareholders committee of the Lake George Mining Corporation have announced, in a circular to shareholders, that it unanimously concurs with the directors' view that the transfer of control and management of the company from the U.K. to Australia would be contrary to the interests of the majority of shareholders.

Paringa to Exercise Option Over Wheal Fortune

Paringa Mining & Exploration have announced that at a directors meeting held in London on August 5 the board decided to exercise its option to purchase a 60 per cent interest in the Wheal Fortune Extended Lead Mine, the balance of 40 per cent being retained by the vendors. The cost of this acquisition including all costs of examination will, it is stated, amount to approximately £35,000.

The announcement states that the Wheal Fortune Extended Lead Mine has operated profitably for some time, and in the absence of unforeseen circumstances, and a substantial fall in lead prices, the board are of the opinion that the mine will continue to earn profits.

Company Shorts

Free State Geduld Offers One For Six at 45s.—Free State Geduld Mines have announced the offer to shareholders registered on August 12, of 1,000,000 of the company's reserved 5s. shares at 45s. in the ratio of one new share for every six shares held. Each new share will carry with it a free option to take up one further share at 55s. a share (South African currency), until October 30, 1953. Shareholders will be permitted to make application for shares in excess of those to which they are entitled.

This share offer has been underwritten by The Anglo American Corporation of South Africa for a cash commission of 2½ per cent. Treasury permission has been obtained for the U.K. portion of the issue and letters of right will be posted to shareholders on or about August 21. The closing date will be September 8.

In making this announcement the company states that the amount of new funds required to repay the temporary loan from Anglo American Corporation, to complete the shaft sinking and development programme and to provide for a reduction plant capable of milling 125,000 tons per month is estimated at £5,000,000, a portion of which will not be spent until the mine has started milling. The new share issue will provide £2,250,000 immediately which, it is estimated, will be sufficient to meet the company's requirements up to the middle of 1953. If necessary, arrangements will be made to finance operations from that date until October 30, 1953, by temporary loans. At this date the position will be known with regard to the options which, if exercised, will bring in a further £2,750,000. The present issued capital of the company is £1,500,000 in 5s. shares.

It is expected that the milling of development ore will begin in the middle of 1953. The drive from Western Holdings towards Free State Geduld has started and the results of development in the southern area will probably be available during the September quarter of next year.

Attock Oil Maintains Dividend.—The net profit of the Attock Oil Co. for the year 1951, after providing for all expenses and £344,952 (£383,951) for U.K. and Pakistan taxation, amounted to £133,295 against £120,012 in 1950. The distribution was maintained at 12½ per cent absorbing a net amount of £118,125, and the carry forward at the fiscal year-end was £229,545 compared with £208,612 brought in. Mr. Thomas Taylor McCreath is chairman.

Rand and O.F.S. Returns for July

The general rise in profits announced by the South African gold mines in their returns for July arises in part from the longer working month and partly from the change in the gold price from 248s. 3d. per f.oz. to 249s. 6d. per f.oz.

This increase of 1s. 3d. per f.oz. stems from a new agreement whereby the monthly returns now take into account fluctuations in the gold price caused by variations allowed in the sterling-dollar exchange rate. For the first six months of the current year the additional revenue arising from these exchange fluctuations were pooled into a special account. But at the end of last month this account was closed and each mine was credited with the amount it had contributed, the refund from the account was then lumped in together with the additional revenue received from premium gold sales and published in the mines' June quarterly reports. Despite this procedure having been adopted it must be stressed that the higher gold price now obtaining is completely separate from any additional revenue the mines receive from selling 40 per cent of their output at premium prices on the free market.

Stillfontein Gold Mining which began its career as a producer last month reported a loss of £19,245. Tonnage throughput totalled 40,000 tons having an average grade of 3.2 dwt. which yielded 6,411 oz. of gold and a revenue of £80,166. The low grade of the ore sent to the mill was obviously due to the gold absorption by the new plant and to the low grade development ore used.

Company	July, 1952 Tons (000)	Yield (oz.)	Profit (£000)	Year ends	Current Financial Year Total to Date Tons (000)	Yield (oz.)	Profit (£000)	Last Financial Year Total to Date Tons (000)	Yield (oz.)	Profit (£000)
Gold Fields										
Libanon	83	16604	42.5	J	83	16,604	42	87	16,094	46
Luipaards V.	104	19485	52.3	J	104	19,485	52	102	18,899	61
Rietfontein	28	6140	28.0	D	190	42,094	194	190	42,272	220
Robinson	119	19635	18.5	D	789	128,763	78	776	122,778	85
Simmer & J.	129	20612	20.0	D	870	138,569	117	871	138,481	222
Sub Nigel	69	23840	128.8	J	69	23,840	129	66	23,608	135
Venterspost	105	23625	60.7	J	105	23,625	61	103	21,939	77
Vlakfontein	39	14516	83.9	D	259	96,643	552	255	96,203	562
Vogels	83	21788	86.8	D	555	144,902	563	531	133,475	583
West Drie	26	14695	99.3	J	26	14,695	99	—	—	—
Anglo American*										
Brakpan	122	21489	36.9	D	814	148,010	261	800	150,239	415
Daggas	237	56281	401.6	D	1631	388,994	2764	1604	397,344	3042
East Daggas	98	17395	63.0	D	677	121,108	446	692	127,443	595
S. A. Lands	111	19958	68.7	D	778	140,270	503	792	138,631	555
Springs	166	21736	20.9	D	1153	150,859	129	1173	152,292	241
Welkom	54	10501	15.1	D	330	54,308	L64	—	—	—
W'tern Reefs	115	23907	104.6	D	777	162,952	724	680	152,887	787
Central Mining										
Blyvoor	112	68397	604.4	J	112	68,397	604	107	70,086	638
City Deep	157	31694	24.1	D	1077	216,903	185	1132	230,221	526
Consol M.R.	188	26111	34.6	J	188	26,111	35	198	26,754	55
Crown	275	43708	45.8	D	1869	303,536	262	1915	326,236	735
D. Roodep'rt	185	32080	92.9	D	1258	215,802	584	1266	214,298	715
East Rand P.	210	44628	141.4	D	1459	312,411	1057	1526	310,705	1259
Modder B.	57	6332	6.0	D	398	43,927	47	380	43,431	65
Modder East	122	14041	23.5	J	122	14,041	23	121	13,972	38
Rose Deep	84	11739	8.1	D	588	81,679	75	576	81,294	156
Welgedacht	35	4320	4.5	J	35	4,320	4	32	3,924	4
J.C.I.*										
E. Champ	31	4481	8.0	D	217	32,780	58	228	33,645	77
Govt.G.M.A.	268	31530	50.1	D	1688	223,888	348	1603	220,667	413
New State	48	6061	1.0	D	317	45,309	7	418	53,845	23
Randfontein	360	41375	30.1	D	2462	291,757	205	2346	285,577	337
Wit. Gold	62	7405	2.5	D	417	49,778	17	414	47,689	27
Union										
East Geduld	151	45305	365.1	D	1015	304,528	2410	1012	303,641	2482
Geduld Prop.	108	15678	34.3	D	734	106,507	255	734	108,238	326
Grootvlei	200	43300	282.3	D	1363	295,347	1898	1367	307,180	2093
Marievale	63	15750	72.9	D	424	106,173	494	424	105,610	526
St. Helena	51	10161	7.6	D	323	63,689	28	—	—	—
Van Dyk	111	15990	13.4	D	751	108,518	87	700	105,636	131
General Mining*										
S. Roodep'rt	28	6325	24.5	J	28	6,325	24	27	5,920	22
W.Rand Con.	211	33020	125.0	D	1474	230,593	867	1478	236,719	1138
Anglo-Transvaal*										
N.Klerksd'p	11	1304	1.0	D	78	8,729	7	61	7,286	9
Rand Leases	188	31388	73.6	J	188	31,388	74	184	30,636	89
Village M.R.	34	5288	15.1	J	34	5,288	15	34	5,303	18
Others										
N. Kleinf't'n	110	14403	31.9	D	740	97,422	518	754	97,973	301
Spaarwater	11	2465	L1.8	D	72	000,000	L19	72	16,441	L16

Notes.—Profit figures are in all cases figures of working profit excluding profit from sale of gold at premium prices. In case of groups marked with an asterisk (*) profit includes sundry revenue. Profit figures preceded by L indicate a loss

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AMALGAMATED BANKET AREAS

The Sixteenth Annual General Meeting of Amalgamated Banket Areas Ltd., was held on August 6 in London.

Major-General W. W. Richards, C.B., C.B.E., M.C., chairman of the company, presided.

The following is an extract from the statement of the chairman, which was circulated with the report and accounts:—

The year's net profit of £227,497 is the best ever attained by the company. It was necessary to charge this profit with the expenditure incurred in the maintenance and development of the Fanti and Tamsoo Mines, £113,106, and we have also recommended for your consideration that a dividend of 2½ per cent., less tax, should be paid in respect of the year ended September 30, 1951. This would absorb £37,864 and, with the carry-forward from 1950, leave a balance of £202,867 to the credit of profit and loss account.

This modest recommendation, if accepted, will mark the return of our company to the dividend list after an absence of 14 years.

Production—For the third successive year a record tonnage of ore was mined and milled and, at 656,545 tons, showed an increase over the previous year of 118,855 tons, with a gold recovery of 93,749 oz.

I am particularly pleased to inform you that the development of the 20th Level of the Abbontiakoon Mine has, since the end of the year, met with some success. To date, on 20 "C" East Limb Drive North, the reef has been sampled over a length of 620 ft. giving an average value of 5.7 dwt. per ton over a width of 39.5 in. This is a development result of major importance.

In the Fanti section, better values are being encountered in the latest development of No. 14 Drive South in the Fanti South shaft. The last 185 ft. sampled have averaged 5.9 dwt. per ton over a width of 42.2 in.

The ropeway linking the Tamsoo Mine with the Central Mill was completed in June, 1951; since when a steady flow of Tamsoo ore has been sent for treatment. Reasonable progress has been made with the Fanti ropeway; but delays in steel deliveries are affecting the date of completion, which is now expected by the Spring of 1953.

ORE RESERVES

The total ore reserves are computed at 4,255,035 tons. Of this tonnage, 2,107,097 tons averaging 5.589 dwt. over a width of 40.178 in. represents the underground ore, and 1,926,966 tons averaging 1,986 dwt. the surface deposit at Pepe; the balance of 220,972 tons at 0.877 dwt. being the value of the parting reef at Pepe.

We welcome the authority of the Gold Coast Government to sell, as from May 1, 1952, the whole of our gold production on the free market; instead of only 40 per cent of our production as from October 1, 1951.

The report and accounts were adopted.

Mining Matters

Nigel Wants U.K. Industrialists.—Nigel, the flourishing Rand gold mining centre 40 miles from Johannesburg, South Africa, wants industrialists from Britain to open new factories there.

The Municipality of Nigel, making this announcement, declares that while the town was hardly more than a large gold mining camp 20 years ago it has now a population of more than 30,000 (over 7,000 European), all the amenities of a modern town, and a 1,000 acre municipally-owned site for an industrial estate. The estate has every facility, is situated near the town's railway which connects Nigel with Johannesburg and other neighbouring towns, and factory sites are available at upwards of £100 an acre.

Surrounded by expanding markets, Nigel has the advantage of low labour costs—the standard wage for unskilled native labour is £1 6s. 0d. per week, plus a 12s. 6d. cost-of-living allowance, and labour is plentiful. Moreover, the Municipality states that materials are cheap and abundant and the five gold mines in the area produce over £7,000,000 worth of gold a year and spend over £4,000,000 on stores and supplies. One of the special inducements offered by the Municipality is the complete absence of a housing problem. And houses will be built for newcomers wherever they choose in the Nigel area for a deposit of £50, the remainder being paid over a period of 25 years. The council also owns blocks of flats.

Britannia Batteries: Change of Address.—The London sales office of Britannia Batteries has just been transferred from its old address at 66, Victoria Street, S.W.1, to new premises at 53 Victoria Street, S.W.1. The telephone number and telegraphic address are: Abbey 6168-9 and Britanicus, Sowest, London.

The International Tin Research and Development Council has resolved that it will in future be known as the **International Tin Research Council.** This change will not affect the policy of the Council nor alter its activities.

MARLU GOLD MINING AREAS

The Seventeenth Annual General Meeting of Marlu Gold Mining Areas Ltd., was held on August 6 in London.

Major-General W. W. Richards, C.B., C.B.E., M.C., chairman of the company, presided.

The following is an extract from the statement of the Chairman which was circulated with the report and accounts for the year ended September 30, 1951:—

Our ore reserve position is such that close study and extreme control must be exercised in the matter of grade of ore mined and sent to the mill. The oxidized ore deposits at Marlu are of low grade, in the main averaging only 2½ dwt. per ton. It is, therefore, apparent that to carry on mining profitably we must be able to mine large tonnages reasonably free from mishaps and treatment troubles. It is of paramount importance that the strictest control of expenditure be exercised and that costs be kept at the absolute minimum. Regrettably the matter of increased costs is to a very large degree outside the control of the directors and staff.

During the year under review, 471,180 tons of ore were milled and treated. A decrease of 29,560 tons when compared with the previous year; but the aggregate mine expenditure was £40,000 more—equal to 2s. 8d. per ton milled. The average gold content per ton was 2.248 dwt.—0.17 dwt. less than the average of the previous year, and unfortunately the residue higher by 0.1 dwt. per ton. The net yield was 1.806 dwt. a drop of 0.27 dwt.,

The bullion proceeds for the 42,547 oz. of gold produced were £525,316. This is less by some £117,000 than the revenue in the previous year. The final profit earned was £32,494 and the credit balance carried forward on profit and loss account is £5,503.

In the current year 331,145 tons of ore have been treated for the period October-May yielding 29,838 oz. of gold and a mine operating profit of £72,489.

The installation of a plant to treat the underground ore proceeded during the year. The erection was completed in February this year. Due to the shortage of skilled underground labour, development work and stope preparation has been restricted and, as a consequence, very little ore of ore reserve grade has so far been milled. We have been fortunate in securing the services of an engineer from one of our associated ompanies and we feel that this will have the desired effect of increasing tonnage from this section of the mine.

On the whole, the supply of labour has been adequate, but some difficulty is being experienced in getting together the complement required for the underground section.

The report and accounts were adopted.

HER MAJESTY'S COLONIAL SERVICE
SIERRA LEONE

A vacancy exists for a Mining Geologist (27079/40) in Sierra Leone. The appointment is on probation to the pensionable establishment with salary, according to approved professional experience, in the scale £570—£1,000 per annum plus £150—£300 per annum expatriation allowance. Cost of living allowance of 12½ per cent of basic salary is payable. Government quarters, including heavy furniture, are provided, when available, at a nominal rent; low income tax; free first-class passages for officer, wife and two children under the age of ten once each way each tour; seven days leave on full salary for each completed month of residential service; free medical attendance for officer but not his family. Candidates must possess a B.Sc. degree with Honours in Mining Geology. Duties include: searching for new mineral deposits; mapping on 1 in. and more detailed scales of the petrology and mineralogy of known deposits; geophysical prospecting by resistivity and magnetometry.

Intending candidates should apply in writing to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, S.W.1, giving details of their age, qualifications and experience. They should mention this paper and quote the reference number (27079/40).

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REPORT OF THE DIRECTORS FOR THE QUARTER ENDED JUNE 30, 1952

Shaft Sinking: Ventilation Shaft.—The shaft was sunk 578 ft. to a depth of 4,277 ft. below the collar. A pump station was cut and equipped at the 4,000 ft. elevation and a return airway station was cut and supported at the 4,193ft. elevation.

The shaft is now in quartzites of the Main Bird series.

Approximately 32 per cent of the total time available was absorbed in the treatment of ground by the cementation process.

The top band of the "A" reef was intersected at a depth of 3,919 ft. with an average value of 0.68 dwt. over a channel width of 8.4 in.

The bottom band of the "A" reef was intersected at 3,930 ft. with an average value of 2.63 dwt. over a channel width of 16.8 in.

The shaft passed through the "B" reef horizon from 4,086 ft. to 4,039 ft. with an average value of 0.15 dwt. over a channel width of 40 in.

No. 3 Shaft.—The shaft was sunk 586 ft. to a depth of 3,759 ft. below the collar.

The shaft is still in quartzites of the Elsburg series.

Approximately 40 per cent of the total time available was absorbed in the treatment of ground by the cementation process.

Shaft sinking was delayed by the intersection of water-bearing strata and a steeply dipping dyke approximately 30 ft. in width.

Plant, Buildings and Equipment.—Eleven permanent mine houses for Europeans in the Harmony suburb of the proposed Virginia Township were completed, bringing the total number of permanent houses built for Europeans to 103. The office block at No. 3 shaft was completed and is in use. A timber storage shed and a hangar were built during the quarter. A start was made on extensions to the native hostel, on the erection of a fourth boiler at the Ventilation shaft, and on extensions to the power sub-station at No. 3 shaft. Preliminary work on the excavations for the Reduction Works was begun.

Capital Expenditure.—Capital expenditure during the quarter amounted to £319,504.

General.—The supply of native labour for shaft sinking and surface work was adequate.

The water supply from the Vaal and Sand Rivers was sufficient to meet requirements at the mine.

The road from the Ventilation shaft to No. 3 shaft was macadamized and work is in progress macadamizing the road from No. 3 shaft to the main Provincial road.

Borehole L.R.8 had reached a depth of 3,185 ft. at the end of the quarter.

REEF INTERSECTIONS AND SAMPLING RESULTS SINCE THE CLOSE OF THE QUARTER

The Ventilation shaft intersected the Leader Reef at a depth of 4,335 ft. below the collar. Sampling at 5 ft. intervals around the circumference of the shaft gave an average undiscounted value of 1.06 dwt. over a channel width of 50.4 in., equivalent to 53 in.-dwt.

The shaft intersected the Basal Reef at a depth of 4,364 ft. below the collar. Sampling at 5 ft. intervals around the circumference of the shaft gave an average undiscounted value of 10.8 dwt. over a channel width of 47.4 in., equivalent to 478 in.-dwt. The Basal Reef was later stoped out for 15 ft. around the shaft to facilitate the removal at a later date of the shaft pillar and the face of the stoped out area was sampled at 5 ft. intervals, the average undiscounted value being 15.4 dwt. over a channel width of 45.6 in., equivalent to 702 in.-dwt.

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Mining Companies' Directors' Reports for Quarter Ended 30th June, 1952

Following are the reports on work done during the quarter ended 30th June, 1952

ANGLO-TRANSVAAL COLLIERIES, LIMITED

The Sales Output of the Subsidiary Collieries controlled by this Company for the Quarter ended 30th June, 1952, totalled **281,756** tons.

EASTERN TRANSVAAL CONSOLIDATED MINES, LIMITED

The total tonnage treated during the Quarter ended 30th June, 1952, by the four gold mines operated by this Company amounted to **54,920** tons, resulting in a Working Profit (including Sundry Revenue) of **£48,478** for the Quarter.

Revenue from the sales of gold at higher than standard prices, sold for manufacturing purposes during the three months ended 30th June, 1952, amounted to **£5,302**, making a Total Profit for the Quarter of **£53,780.**

The Profit as shown above does not take into consideration the amount, estimated at **£14,000** for the Quarter, payable to the Government in Mining Taxation. Capital Expenditure for the Quarter amounted to **£23,071.**

SHAFT SINKING

NEW CONSORT—The Prince Consort sub-vertical Shaft was sunk **133** feet during the Quarter to its final depth of **2,104** feet.

AGNES—The Ivy Shaft was sunk **25** feet during the Quarter to a total depth of **1,098** feet.

GENERAL—The Ben Lomond Tunnel was advanced **390** feet during the Quarter to a total length of **4,132** feet.

DIVIDEND

A Dividend (No. 25) of **7½** per cent (**4½d.** per share) was declared payable to shareholders registered at 30th June, 1952.

MERRIESPRUIT (ORANGE FREE STATE) GOLD MINING COMPANY, LIMITED

SHAFT SINKING

No. 1 VERTICAL SHAFT was sunk **132** feet in Ventersdorp Sediments to a total depth of **2,920** feet. The shaft was concrete lined to a depth of **2,883** feet, of which **131** feet were accomplished during the Quarter. The intersection in pilot holes of water bearing fissures in badly fractured ground, requiring extensive cementation, considerably delayed shaft sinking operations particularly during April and May, when sinking was suspended.

SHAFT EQUIPMENT—Work was continued on the erection of the permanent steel headgear at No. **1** Shaft and the steelwork of the permanent Winder House at this shaft has been completed.

LABOUR—The Labour Strength at the end of the Quarter was: Europeans **55**, Natives **409.**

CAPITAL EXPENDITURE—Capital Expenditure amounting to **£170,288** was incurred during the Quarter on shaft sinking, buildings and plant. The total Capital Expenditure, including preliminary expenses, incurred to 30th June, 1952, amounted to **£2,057,289.**

MIDDLE WITWATERSRAND (WESTERN AREAS), LIMITED

INTERESTS IN THE ORANGE FREE STATE

MINERAL RIGHTS—Your Company's interests in the Orange Free State consist of Mineral Rights purchased over **12,099** morgen in the Virginia Area; the farm van den Heeversrust No. 419, measuring **629** morgen, situate North-West of Odendaalsrus; the farm Klein Begin No. 911, measuring **129** morgen, adjoining the Western boundary of the Freddies North Lease Area; the farm Stephanus Rust No. 897, measuring **209** morgen, situate West of Odendaalsrus, and over a one-half undivided share of the farm Remaining Extent Wesselsgunst No. 261, measuring **58** morgen **1½** square roods, situate immediately North of the Freddies North Lease Area Limited. During the Quarter, your Company abandoned its option over Sub-division **2** of farm Welgelegen No. 382, district Winburg, measuring **573.71** morgen.

Your Company retains its interests in Option Contracts over the farm Britzpan No. 1289, district Odendaalsrus, measuring **229** morgen; over **801** morgen in the Winburg district, and a participation in subscription rights accruing to Lydenburg Estates, Limited, in respect of certain of that Company's interests in the Orange Free State.

INTERESTS IN THE KLERKSDORP DISTRICT OF THE TRANSVAAL

MINERAL RIGHTS—Your Company has exercised its options to acquire the Mineral Rights of the Eastern portion of the Klerksdorp Townlands, measuring **4,557** morgen approximately, and owns a **98.4** per cent share of the Mineral Rights of a portion of the farm Elandsheuvel No. 54, district Klerksdorp, measuring **254** morgen **375** square roods.

Your Company retains its interest in options to purchase the Surface and Mineral Rights of certain portions of the farm Palmietfontein No. 29, district Klerksdorp, totalling **1,186** morgen approximately.

REPORT FOR QUARTER ENDED 30th JUNE, 1952—A Total of **16,252** feet was drilled in **7** Boreholes.

Borehole No.	Drilled on joint account with	Farm	Depth at 30th June, 1952 Feet	Formations traversed during Quarter: Borehole Depths (feet) From	To	Description	Reefs intersected: Reef	Depth feet	Value dwts.	Corrected width inches	Inch-dwts.	Remarks
VDH. 6/51	General Exploration Orange Free State, Limited	Van den Heeversrust No. 419, District Odendaalsrus	6,466 Original borehole completed on 18th February, 1952 Deflection in progress									Progress delayed by the intersection of fissured ground.
TL. 30/52		Klerksdorp Townlands No. 44, District Klerksdorp	6,230 In progress	2,440 5,792	5,792 6,230	Ventersdorp Lava Witwatersrand System (Hanging Wall of Gold Estates Reef Zone)						
TL. 33/52		Klerksdorp Townlands No. 44, District Klerksdorp	1,100 Completed on 9th April, 1952	700 916	916 1,100	Witwatersrand Sediments (Vaal Reef Hanging Wall) Witwatersrand Sediments (Vaal Reef Foot Wall)						
TL. 34/52		Klerksdorp Townlands No. 44, District Klerksdorp	1,560 Borehole completed on 11th June, 1952	295 577 1,177 1,216	577 1,177 1,216 1,560	Ventersdorp Lava Witwatersrand Sediments Gold Estates Reef Zone Witwatersrand Sediments	Reef in Gold Estates Reef Zone Vaal	1,190 1,529	5.37 0.67	42.8 33.0	230 22	Core recovery incomplete Core recovery complete

TL. 35/52		Klerksdorp Townlands No. 44, District Klerksdorp	4,225 In progress	0 2,828	2,828 4,225	Ventersdorp Lava with bands of agglomerate Ventersdorp Lava								
TL. 36/52		Klerksdorp Townlands No. 44, District Klerksdorp	4,164 In progress	0 3,051	3,051 4,164	Ventersdorp Lava with bands of agglomerate Ventersdorp Lava								
TL. 38/52		Klerksdorp Townlands No. 44, District Klerksdorp	161 In progress	0 127	127 161	Red Sand and Mud Witwatersrand Sediments (Vaal Reef Foot Wall)								

In addition, the Company is participating in the drilling of the following boreholes in the Orange Free State:—

Borehole Number	Farm	Drilled by
ERK.1	Energie No. 896, district Odendaalsrus	Free State Development and Investment Corporation, Limited
BH.2 (RD.2)	Rosedale No. 898, district Odendaalsrus	General Exploration, Orange Free State, Limited
BH.3	Spes Bona No. 921, district Odendaalsrus	General Exploration, Orange Free State, Limited

DRILLING IN THE STILFONTEIN-HARTEBEESTFONTEIN AREA (LUCAS BLOCK)

During the Quarter ended 30th June, 1952, a total of **58** feet was drilled on joint account with the Strathmore Development Company, Limited, in deflections of Borehole WI.2. This programme of drilling has now been completed.

The following results of Assay Values of Vaal Reef intersections were published during the Quarter:—

Borehole Number	Depth (Feet)	Value (Dwts.)	Corrected Width (Inches)	Inch-Dwts.	Remarks
WI.2	8,585 8,585	21.56 19.80	23.1 38.9	498 770	2nd Deflection, Core recovery incomplete. 3rd Deflection, Core recovery complete.

NEW KLERKSDORP GOLD ESTATES, LIMITED

Tons milled—**34,500** yielding **3,804.10** ounces fine.

Revenue from Gold	**£47,218**
Working Costs	**£44,562**
	£2,656
Sundry Revenue	**£406**
Working Profit for Quarter	**£3,062**
Working Costs per ton milled	**25s. 10d.**
Working Costs per fine ounce recovered	**234s. 3d.**

In addition to the above revenue, **£738** accrued in respect of increased revenue from sales of gold at higher than standard prices sold for manufacturing purposes during the three months April to June, 1952, inclusive. The Working Profit for the Quarter, as shown above, does not take into consideration interest on loan amounting to **£1,490** for the Quarter.

No liability was incurred for Mining Taxation payable to the Government in respect of the Profits earned for the Quarter.

CAPITAL EXPENDITURE—The expenditure on Capital Account for the Quarter amounted to **£474.**

DEVELOPMENT—The total footage advanced during the Quarter amounted to **1,278** feet. Of **1,105** feet sampled, **225** feet, equal to **20.4** per cent, were classed as payable at an average value of **4.61** dwts., over a channel width of **29** inches, equivalent to **135** inch-dwts. (The above results are based on actual sampling. No allowance has been made for adjustments necessary in the valuation of the corresponding Ore Reserve.)

RAND LEASES (VOGELSTRUISFONTEIN) GOLD MINING COMPANY, LIMITED

PRODUCTION

Tons crushed: **566,000** yielding **94,511** ounces fine.

		Per Ton Crushed	
Revenue from Gold	**£1,175,152**	**41s. 6d.**	
Working Costs	**£966,339**	**34s. 1d.**	(**204s. 6d.** per oz. fine)
	£208,813	**7s. 5d.**	
Sundry Revenue	**£17,500**	**0s. 7d.**	
Working Profit for Quarter	**£226,313**	**8s. 0d.**	

Working Costs per ton **34s. 1d.** include **5s. 7d.** in respect of development expenditure.

In addition to the above revenue **£33,607** accrued in respect of increased revenue from the sales of gold at higher than standard prices, sold for manufacturing purposes during the three months April to June, 1952, inclusive, and from variations in official gold prices during the six months ended 30th June, 1952.

The Working Profit for the Quarter as shown above does not take into consideration the amount, estimated at **£81,000** for the Quarter, payable to the Government in Taxation and as its share of the profits in terms of the Mining Lease.

CAPITAL EXPENDITURE—The expenditure on Capital Account during the Quarter amounted to **£43,575.**

SHAFT SINKING

No. 2 KIMBERLEY REEF INCLINE SHAFT was advanced **123** feet at small dimensions to a total length of **1,139** feet. Of this total length, **1,016** feet has been sliped to full dimensions, **138** feet being advanced during the Quarter.

DEVELOPMENT

A total of **19,677** feet of shaft sinking and development was accomplished during the Quarter, of which **9,325** feet were sampled, showing **4,215** feet, equal to **45** per cent, as payable. Payable reef disclosures were distributed as follows:—

Reef	Footage Sampled	Payable				
		Feet	Percentage	Channel Width (inches)	Channel Value (Dwts.)	Inch-Dwts.
Main Reef	1,360	670	49	32.1	5.62	180
Main Reef Leader	3,250	2,260	70	10.1	27.12	273
South Reef	1,145	385	34	9.6	20.45	197
Total Main Reef Series	5,755	3,315	58	14.5	16.97	246
Bird Reef	1,450	270	19	36.3	4.42	160
Kimberley Reef	2,120	630	30	46.9	6.25	294
Totals and Averages	9,325	4,215	45	20.7	11.94	247

(The above results are based on actual sampling. No allowance has been made for adjustments necessary in the valuation of the corresponding Ore Reserve.)

DIVIDEND—A Dividend (No. 32) of **13.75** per cent (**1s. 4½d.** per Share) was declared payable to shareholders registered at 30th June, 1952.

ORE RESERVE

MAIN REEF SERIES—The Ore Reserve, fully developed at 30th June, 1952, was estimated to be **4,133,000** tons, having an average value of **4.33** dwts., over a stoping width of **41.0** inches. In addition, there are estimated to be contained in shaft and safety pillars **1,006,000** tons, having a value of **4.51** dwts., over a stoping width of **44.4** inches.

In addition to the above Ore Reserve on Main Reef Series are the following:—

Bird Reef—Estimated at **349,000** tons having a value of **2.86** dwts., over a stoping width of **51.0** inches.

Kimberley Reef—Estimated at **299,000** tons having a value of **2.65** dwts., over a stoping width of **58.2** inches.

In the compilation of the above Ore Reserve, the pay limit was based on the existing price of Gold, and anticipated Working Costs.

VILLAGE MAIN REEF GOLD MINING COMPANY (1934), LIMITED

PRODUCTION

		Per Ton Treated	
Tons treated: **102,100** yielding **15,901.64** ounces fine.			
Revenue from Gold	£197,853	38s. 9d.	
Working Costs	£151,084	29s. 7d.	(190s. per oz. fine)
Working Profit for Quarter	£46,769	9s. 2d.	

Working Costs per ton **29s. 7d.** include **5s. 10d.** per ton in respect of Development Expenditure.

In addition to the above revenue **£5,322** accrued in respect of increased revenue from the sales of gold at higher than standard prices sold for manufacturing purposes during the three months April to June, 1952, and from variations in official gold prices during the six months ended 30th June, 1952.

The Working Profit for the Quarter, as shown above, does not take into consideration interest on Loans, amounting to **£565** for the Quarter, nor the further amount, payable to the Government in respect of Mining Taxation, estimated at **£20,000** for the Quarter.

CAPITAL EXPENDITURE—The Expenditure on Capital Account during the Quarter amounted to **£3,060.**

DEVELOPMENT—**9,044** feet of development were advanced during the Quarter, and **3,787** feet of old drives and cross-cuts were reconditioned. In addition **1,210** feet of underground diamond drilling was done as an aid to development.

DIVIDEND— A Dividend (No. 24) of **12** per cent. (**1s. 8d.** per share) was declared payable to shareholders registered at 30th June, 1952

VIRGINIA ORANGE FREE STATE GOLD MINING COMPANY LIMITED

SHAFT SINKING

No. 1 VERTICAL SHAFT was sunk **144** feet in Quartzites of the Upper Witwatersrand System to a total depth of **3,910** feet. In addition, **65,431** cubic feet were excavated in the cutting of the third station at a depth of **3,815** feet, together with the brow box. Shaft sinking was stopped temporarily on 13th May, at a depth of **3,910** feet in order to commence development operations from the third station. The shaft was concrete lined to a depth of **3,903** feet, of which **143** feet were accomplished during the Quarter. The intersection in pilot holes of water-bearing fissures requiring cementation, delayed sinking operations. In the course of arrangements for future requirements, the shaft at the reef intersection was stoped out on reef for a distance of **10** feet beyond its original circumference. **27** sections sampled at **5** feet intervals around the enlarged circumference of the Shaft averaged **7.28** dwts. over a channel width of **54.1** inches equivalent to **394** inch-dwts.

SHAFT EQUIPMENT

No. 1 VERTICAL SHAFT—Work was commenced on the erection of the 4,400 H.P. Permanent Electric Winder. The brick panels of the first section of the permanent Winder House have been completed.

DEVELOPMENT

Arrangements for advancing development from No. 1 Shaft were completed and development was commenced during June. Towards the end of the Quarter, development at No. 3 Shaft was suspended and work is now being concentrated at No. 1 and No. 2 Shafts. A total of **5,566** feet of development was accomplished during the Quarter, and in addition, **41,492** cubic feet were excavated in pump chambers, sumps and service bays.

The following are the results of the Quarter's developments:—

	No. 1 Shaft	No. 2 Shaft	No. 3 Shaft	Totals and Averages
Footage Advanced	590	2,304	2,672	5,566
Footage on Reef	277	308	2,263	2,848
Footage Sampled	255	290	2,425	2,970
Payable Footage Sampled—				
Footage	255	105	1,040	1,400
Percentage Payable	100.0	36.2	42.9	47.1
Channel Width—Inches	44.5	26.8	25.8	29.3
Channel Value—Dwts.	10.25	7.65	9.68	9.69
Inch-Dwts.	456	205	250	284

(The above results are based on actual sampling. No allowance has been made for adjustments necessary in the valuation of the corresponding Ore Reserve.)

REDUCTION PLANT—Work continued to be confined to sections which have been nearly completed and on structures and excavations where postponement of activities would result in deterioration.

EUROPEAN HOUSING—During the Quarter, a further **8** houses were completed and occupied, bringing the total of houses completed in the permanent quarters to **150.**

MINE BUILDINGS AND PLANT—The erection of the **19,000** cubic feet per minute turbo-compressor was completed. Work was continued on the initial portion of the permanent workshops. Work is proceeding on the extensions to the Electricity Supply Commission sub-station at No. 1 Shaft.

LABOUR—The Labour Strength at the end of the Quarter was:—Europeans **233,** Natives **1,285.**

CAPITAL EXPENDITURE—Capital Expenditure amounting to **£467,184** was incurred during the Quarter on shaft sinking, buildings and plant.

The total Capital Expenditure, including preliminary expenses, incurred to 30th June, 1952, amounted to **£5,057,615.**

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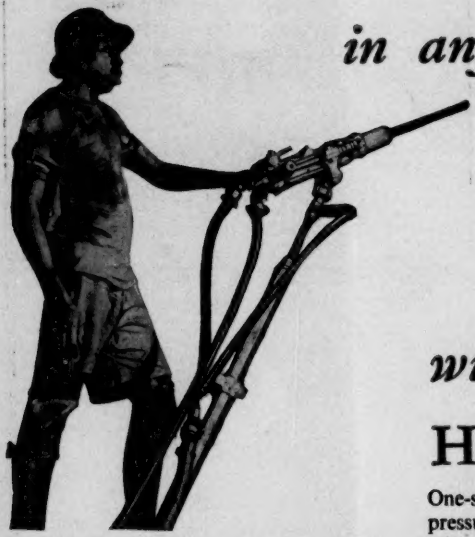

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